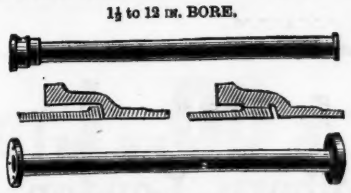
THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXX. No. 1790.] LONDON, AUGUST 31, 1897. [49TH YEAR. PRICE 6d.

GAS AND WATER PIPES

1½ to 12 IN. BORE.



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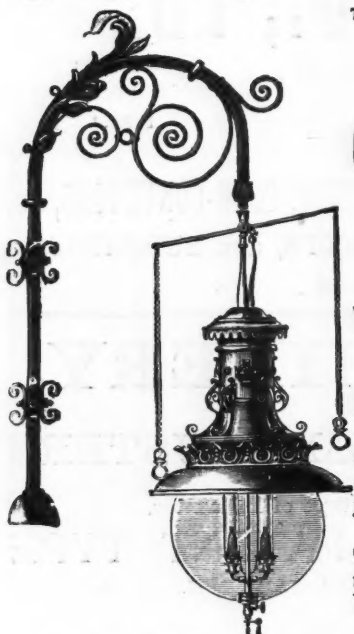

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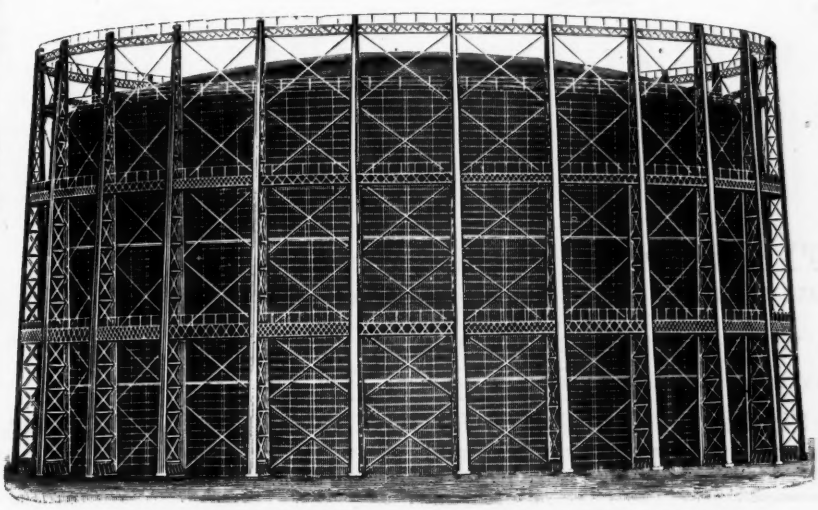

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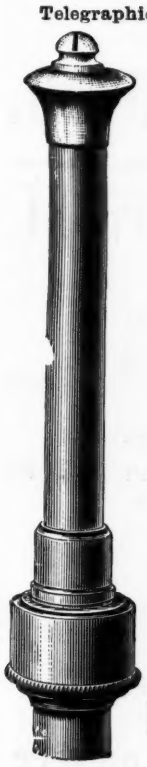

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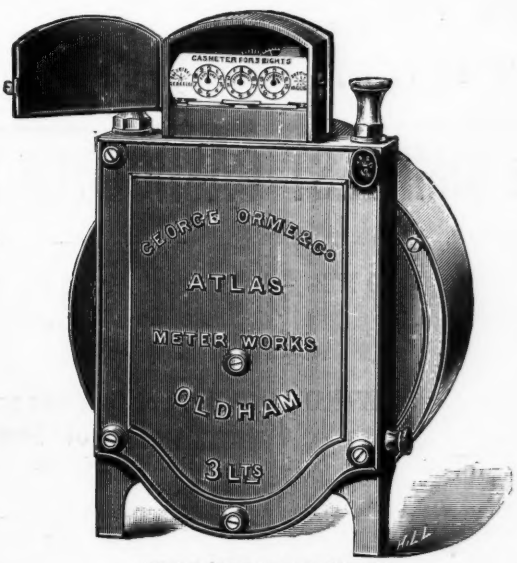

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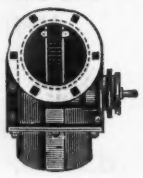

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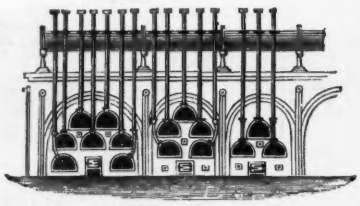

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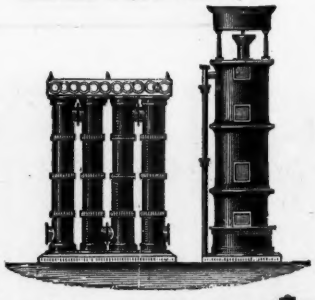

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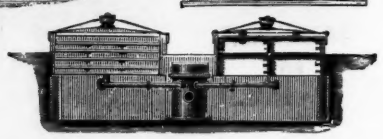

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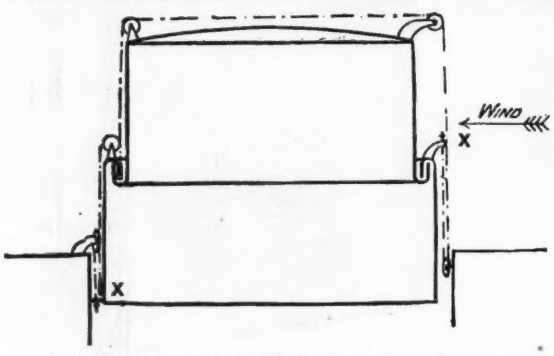

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WIND at 30 lbs. per foot has an overturning power of less than **9 TONS**
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A Gasholder on the Cable System can rely on a support which is exactly known in amount, is direct and simple in application, and is exerted through the strongest parts of the framework only.

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N.B.—If the holder were always at one height, the Cables might be fastened at XX. *The support that the Holder derives from the Cables is equally perfect, notwithstanding its rise and fall.*

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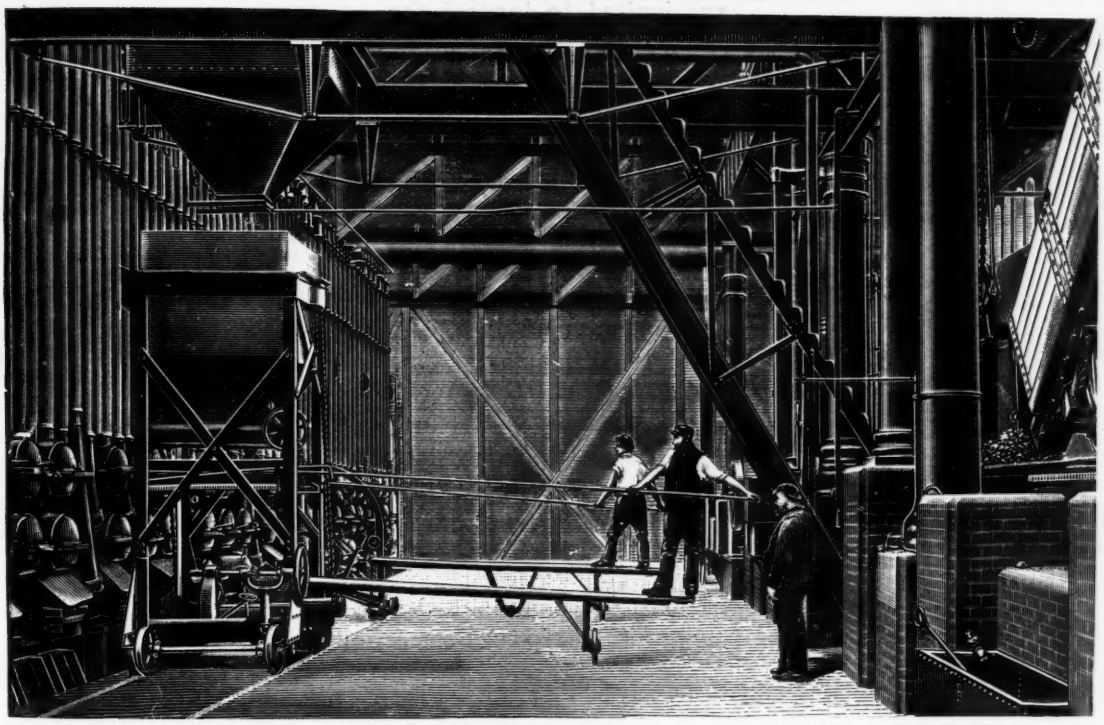
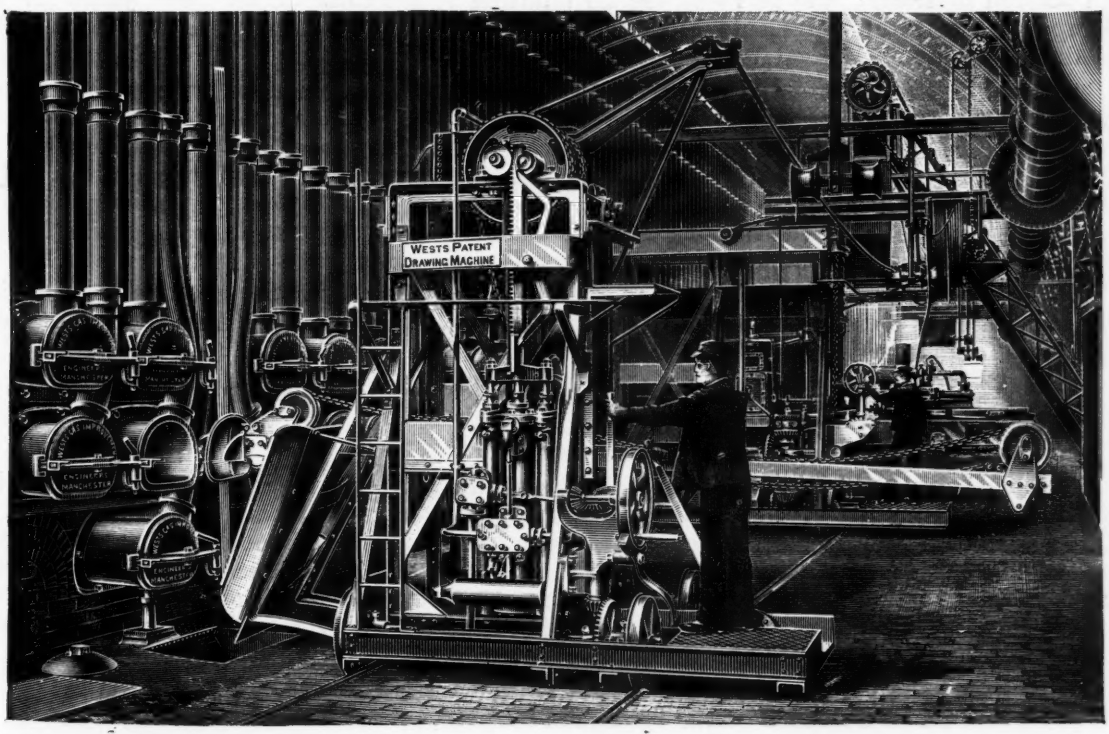


West's Manual Charging and Drawing Machines.



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INCANDESCENT GAS-LIGHT

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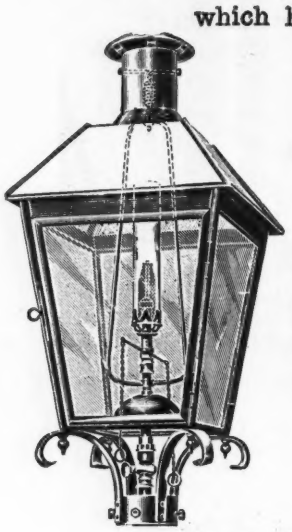

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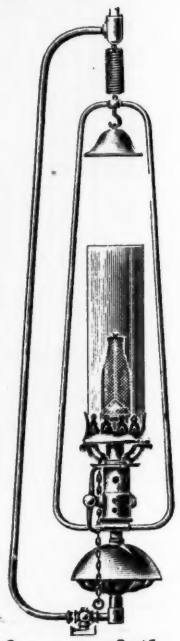

The following are Extracts from a PAPER read by Mr. F. G. DEXTER, before the SOUTHERN DISTRICT ASSOCIATION.

"The success of the experimental (Welsbach) lighting secured the contract for one of the Parish Council Districts; and this was shortly followed by the contract for three years for the city lamps. The total represents altogether about 500 single lamps, and 15 refuge lamps containing two lights."

"In the matter of maintenance of the street lights, the record is favourable—in fact, more so than the estimate provided. By the test-meter, the average daily consumption works out to 38 cubic feet per light, including bye-pass. The bye-pass consumes with a flame half an inch long, $\frac{1}{5}$ foot per hour. This represents 1000 cubic feet per lamp per annum. The average consumption per light, when in use, works out to 12,900 feet per annum, or about $3\frac{3}{5}$ feet per light per hour. The lighting is continued all the year round, from the average times of one hour after sunset to one hour before sunrise."

"The mantles have worked out to an average of three per lamp per annum; but, bearing in mind the absence of frost last winter, the writer believes that four mantles per light is more likely to represent average conditions."

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"The number of lights attended to per man averages 85."

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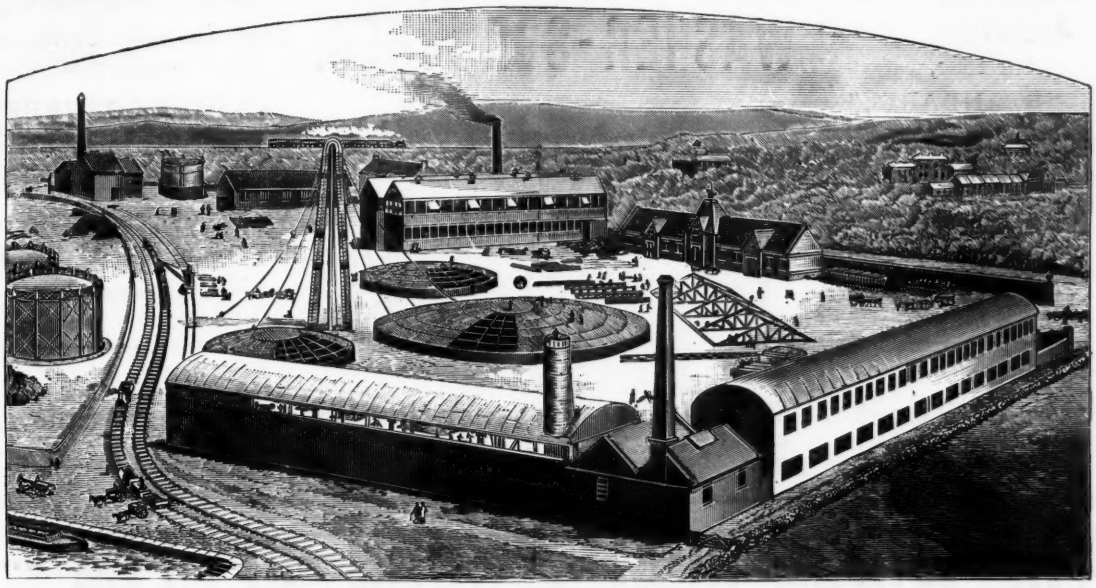

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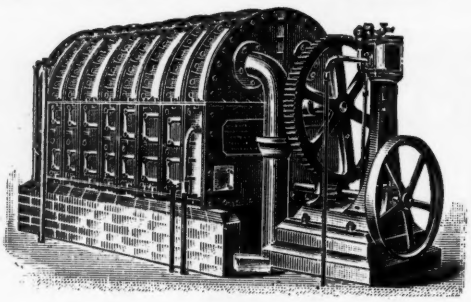

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Belfast	1,700,000	Winchester	200,000
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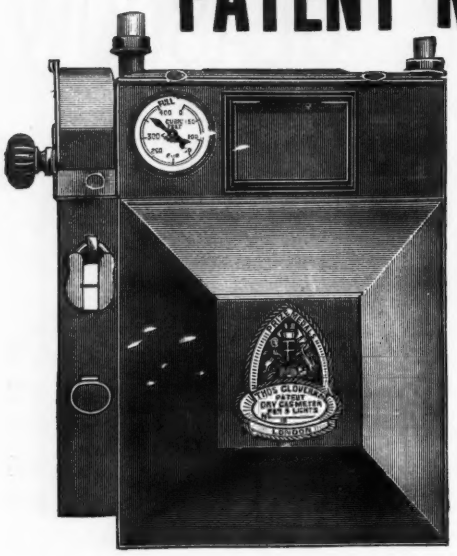

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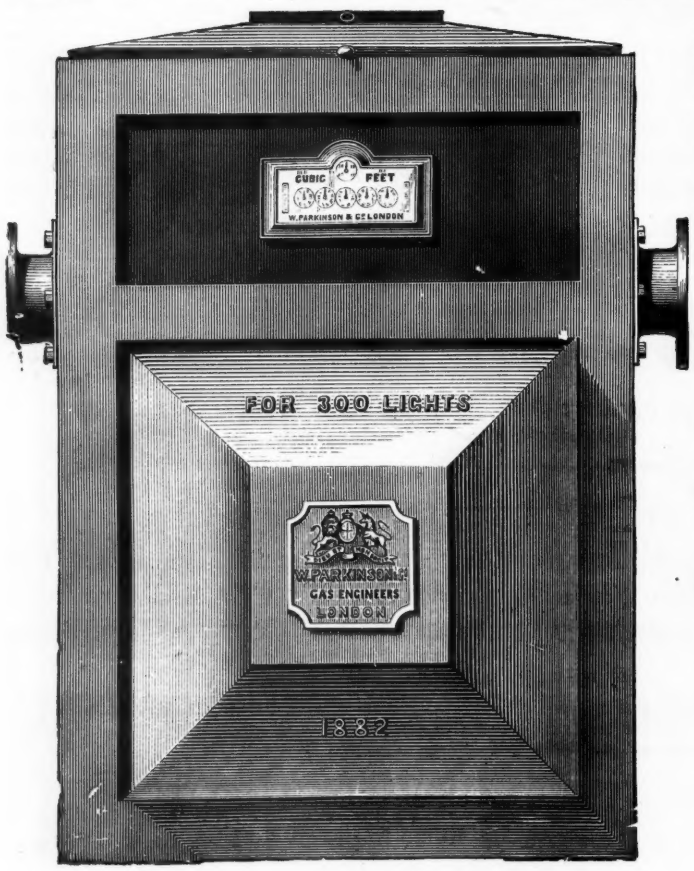

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CONTENTS.

EDITORIAL NOTES:—

GAS, LIGHTING, &c.— PAGE

The Dispute in the Engineering Trade . . . 471
The Burden of Vienna . . . 472
Kentish Coal . . . 472
The Earth's Supply of Coal and Solar Heat . . . 472
Petroleum Fires and Explosions . . . 472
The Death-Roll of the Lamp . . . 473

ESSAYS, COMMENTARIES, AND REVIEWS:—

Gas and Water Companies in the Stock Market . . . 473
Electric Lighting Memoranda . . . 473
Noxious Air in Purifying Houses . . . 474
The Report of the Inspectors of Explosives . . . 475

NOTES:—

Description of an Unknown Gas . . . 476
Profits of the German Coal-Tar Industry . . . 476
A Water-Sampling Bottle . . . 476
A Method of Consolidating Bad Foundations . . . 477

TECHNICAL RECORD:—

Manchester District Institution of Gas Engineers—Quarterly Meeting at Elland . . . 477
A Descriptive Sketch of the Elland-cum-Greetland Gas Undertaking . . . 477
Pacific Coast Gas Association—Fifth Annual Meeting at San Francisco . . . 479
Noxious Air in Purifying Houses . . . 480
The Coal Elevating and Conveying Machinery at the Elland Gas-Works . . . 481
Dr. Bunte on Bye-Products and Auxiliary Materials . . . 482

REGISTER OF PATENTS:—

Filling Gas-Retort Scoops—Lyon, C. W., and Deighton, G. . . . 483
Generating and Storing Acetylene—Gaskell, G. W., and Gibbs, R. R. 483
Generating and Storing Acetylene—Thompson, W. P. (Comucci, V. I.) . . . 484
Manufacturing and Recovering Cyanides—Lewis, G. P., and Cripps, R. A. . . . 484
Generating and Storing Acetylene—Kay, A. . . . 484
Generator for Acetylene Gas—Barker, A. H. . . . 485
Regulating the Admixture of Acetylene Gas and Air—Oving, H. E. 485
Generating and Storing Acetylene—Chesnay, E., Pillion, L., and Bertolus, C. . . . 485
Silencing the Exhaust in Gas-Engines—Smith, M. H. . . . 485
Manufacture of Carburetted Water Gas—Humphreys, A. C., and Glasgow, A. G. . . . 486
Patent Notices . . . 486

CORRESPONDENCE:—

The "Maintainable Profits" of Gas Companies . . . 487
Gas Testing in London . . . 487

MISCELLANEOUS:—

Provincial Gas and Water Companies . . . 488
Meeting of the Croydon Commercial Gas Company . . . 490
Meeting of the Barnet District Gas and Water Company . . . 490
Lancaster Corporation Gas Supply—Increased Gas Consumption; The Prepayment System . . . 491
Rotherham Corporation Gas Supply—The Extension of the Works Sanctioned . . . 491
Consolidation Schemes for Gas Undertakings in the United States 491
Gas as an Illuminant . . . 492
Electric Lighting Notes . . . 492
District Councils and the Supply of Water to Estates . . . 493
Notes from Scotland . . . 494
Gas and Water Companies' Stock and Share List . . . 494
Current Sales of Gas Products . . . 495
Coal Trade Reports . . . 496

PARAGRAPHS:—

PERSONAL: Mr. A. J. Acraman; Mr. W. Thorpe; Mr. E. M. Worsfold; Mr. T. Watson; Mr. Prim; Mr. Ackroyd Bower . . . 476
OBITUARY: Mr. Charles Roper Mead; Dr. Victor Meyer; Mr. E. H. Samms; Sir H. Ayres, G.C.M.G.; Mr. John S. Riggs . . . 476
A New Form of Bunsen Burner—A Lead Joint Remover . . . 475
Eastern Counties Gas Managers' Association—Measurement of the Evaporation of Water—Improvements in the Frédureau Globes . . . 477
Basingstoke Water Supply—A Heavy Compensation Claim in Connection with the Brighton Water-Works—The Billericay Gas-Works—The Limerick Gas Managership—A Novel Method of Protecting Non-Unionists . . . 487
The Liability for Injury to Gas and Water Pipes by Electrolysis—Bolton Gas-Workers and their Wages—Incandescent Gas Lighting in Manchester Streets—The Proposed Auxiliary Gas-Works for Coventry . . . 493
Letter-Boxes on Public Lamps . . . 495
A Water Supply Scheme for Rural Farnham—Extensions at the Chorley Gas-Works—Sales of Shares—Ottawa Gas Company . 496
Sale of a Liquidated Electric Light Company's Plant—Austrian Incandescent Share Companies—New Joint-Stock Companies—Reductions in Price—The Kettering District Council and the Water-Works—Newport (Mon.) Water Supply . . . 497
Conway and Colwyn Bay Water Board—Dawlish Water Supply—The Water Supply of Worthing . . . 498

TO CORRESPONDENTS.

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EDITORIAL NOTES.

The Dispute in the Engineering Trade.

ANOTHER week of the engineers' strike has passed, and matters are precisely where they were a week ago. There is still not the smallest indication of a break in the order of things, nor do we expect anything of the kind yet. Meanwhile there has been the usual crop of "manifestoes," letters to the newspapers, and other polemical literature relating to the disturbance. Mr. George N. Barnes, the General Secretary of the Amalgamated Society of Engineers, has been much in evidence; and several engineering firms have given publicity to their views of the dispute. It is pretty evident that, before the present deadlock is ended, more than one outstanding grievance between employers and employed in the engineering and allied trades will have to be disposed of. The spokesmen of the A.S.E. seize upon every opportunity for declaring that the principle of Trade Unionism is at stake, and that the masters are trying to break the Union. This plea is very useful in attracting the support of some other Unions; but the help does not amount to much. On the other hand, certain employers, while carefully declaring that they have no quarrel with the principle of Trade Unionism, nevertheless take the precaution of stating that if in practice it means certain things, then they are not going to put up with it any longer. Thus we have Mr. G. R. Dunell, of Chiswick, writing to "The "Times" to point out that the Unions are tyrannical, obstructive, and reactionary in many ways. "They not "only frame rules as to the rate of wages, but interfere in "many other respects. For instance, a man, however "willing he may be, and whatever inducement in the way "of extra pay may be offered to him, must not attend to "more than one machine-tool. Again, certain classes of "work are said to belong to one trade; and no man, not "a member of the society representing the trade, may do "a single stroke of that kind of work, however willing "both he and his employer may be that he should do it." The writer goes on to remark that "some Unions would "abolish piecework *in toto*. Again, all men engaged in "operations over which they claim jurisdiction must be "paid by time, and not by results. . . . It is evident "work cannot be carried on on these principles; but if "the eight hours dispute is settled in the men's favour, "and they bring on a demarcation of work campaign, such "things will, I presume, be common. . . . Efforts "are also being made by the Unions to have the appointing of foremen, or rather to have the power invested in "the hands of the men to veto the appointment of leading "men to whom they may object. When this is taken in "conjunction with the abolition of piecework, it virtually "means that the men are to work just as much, or just as "little, as they like for a rate of wages they are themselves "to fix."

This is plain speaking; and it is supported by a letter of Mr. Charles Markham, of Chesterfield, who writes to say that he does not expect to have any trouble with the few society engineers in his employ, to whom he has notified that he is not disposed to give them the eight-hour day. Mr. Markham declares that "for any shop to be run on "Union lines is tantamount to liquidation at an early date, "the object of the Union being to obtain the highest "wages, and in return to give the least possible service." He declares that "the present strike is nothing more nor less "than a fight between the employers and the Union on the "question of who is to be the master in the shops. I have "recognized for some years that this issue would sooner "or later have to be fought, and any master who now or "in the future allows the Union to run his business will "only have himself to thank when he is ruined." Mr. Markham is his own master, and is not bound to conform to the demands of shareholders or any other kind of outsiders. Dr. L. W. Adamson, the Chairman of Messrs. John Abbot and Co., Limited, of Gateshead, told the proprietors at the recent annual meeting that the men had not been working at their best. "He believed "that throughout the whole of the ordinary factories in "the district the men had, in view of securing the eight-"hour day, been systematically putting the masters to as "great a disadvantage as possible." The extension of terrorism at Chelmsford, Leeds, and other places is complained of by local employers, who assert that the police arrangements are generally feeble and insufficient. With regard to all these reports, it is probably safe to remark

that matters are likely to be worse in the sadly-strained engineering trade before they are better. The only hope of speedy peace is in some upheaval of the veteran rank and file of the A.S.E. against the combined tyranny of their socialistic executive and the reckless young members who have nothing to lose and are enjoying their holiday. There is not much chance of any such movement being initiated, however; for the average member of a trade union is as much a cipher in the councils of the body as an ordinary shareholder is in a joint-stock company.

The Burden of Vienna.

THE sorry spectacle presented by the city of Vienna, in consequence of the unjust and absurd action taken by the Municipality in regard to the gas supply, was the subject of comments in the London newspapers last week. The quarrel of the Municipality, under the leading of the anti-Semitic Chief Burgomaster, Dr. Lueger, with the Imperial Continental Gas Association is an old story. It now appears that the Municipality have so far proceeded with their declared policy of taking the gas supply into their own hands as to break open the streets of the city for the purpose of laying a new network of pipes; which, having regard to the fact that the mains of the Association are there already, and have been offered to the City at a fair price, appears a ridiculous and vexatious proceeding, even to the easy-going Viennese populace. Moreover, the loan necessary to build the new Municipal gas-works has not yet been placed; there being no money available for the purpose in the country, and foreign capital having taken alarm at the recent marauding policy of the Municipality with respect to the English Company. If the capitalists of any other nation had been attacked in this way, there would have been telegrams and pointed diplomatic hints galore from high and mighty potentates. But England does not act in this way towards presumably civilized peoples. The Imperial Continental Gas Association provided gas for Vienna when there were no other means of performing this service to the population of the Austrian capital. They have discharged to the last jot and tittle all their obligations to the national and local authorities; they have employed, at good salaries and wages, a large number of native gentlemen and workpeople; and they have sedulously refrained from asserting themselves as an English Company in a way that it is impossible to suppose (say) a French or a German organization would have followed. Now the Association are to be robbed, and the people of Vienna oppressed, by a set of hare-brained demagogues whom the Association have scorned to influence in their favour in the manner for which persons of this stamp lay themselves out the world over. The correspondent of the "Pall Mall Gazette" puts this matter plainly indeed. He says "there are "those here who, familiar with the corruption which pre-"vails in the public departments, do not hesitate to declare "openly that if the English Company had stooped to "bribing the Lord Mayor, things would have continued "as before, and we should have heard nothing of this "ingratitude of the civic powers." This is not a nice thing to say; but the impeachment is only too likely to be well founded. The issue is yet doubtful; but if, in the end, the Association should be made to suffer, for which the Directors are probably quite prepared, whatever loss the shareholders may endure will be as nothing to the evil that will be done to Vienna through the shaking of international confidence in the trustworthiness of the City Government.

Kentish Coal.

AT the first statutory meeting of the Kent Coal Exploration Company, recently held under the presidency of Lord de L'Isle and Dudley, some interesting statements respecting the prospects of the Company were made by the Managing-Director, Mr. W. J. Cousins, and Professor Boyd Dawkins. Mr. Cousins said that during the short lifetime of the Company very considerable progress had been made in the exploration of the coal resources of the county. The Kent coal-fields are now being generally recognized as an established fact. The borehole at Dover has already proved that there are some 20 feet of seams of workable coal. There was a considerable degree of reserve, however, in the Managing-Director's remarks as to what the Company meant to do for itself in the future. Professor Boyd Dawkins was a good deal more candid, though he took care to say that the Kentish landowners would have to co-operate with the Company if any good was to be done. He described the Dover find as a corroboration of the hypothesis advanced a good many years ago by Mr. Goodwin Austin, which was that in all probability the coal-fields of Somersetshire and South Wales in the west, which plunged beneath newer rocks that covered them up, and emerged again under the same newer rocks in France and Belgium, were really connected by fields of the same nature. Professor Boyd Dawkins declared that the newly-found Dover coal-field is identical with that of Northern France and Belgium. How far west this field extends has yet to be demonstrated. In his opinion, only just the surface of these concealed fields has been touched. The difficulty is to know where to bore so as to strike them most promisingly. In the future, however, the south-east of England is to have a Black Country of its own, from which all the untold blessings of such a gift of Nature are to flow. Let us hope that the result will be generally satisfactory. Under all these official protestations, the knowing observer will find no contradiction of the generally received opinion that while there is coal in Kent it will take some getting, and not be worth very much when brought to bank. But, of course, further borings may change all this.

The Earth's Supply of Coal and Solar Heat.

LORD KELVIN is one of the grand old men of science who can always be depended upon to say something interesting whenever he opens his mouth; and he has been talking very entertainingly at Toronto upon the fuel and air supply of the earth. The two matters are much more closely connected than ordinary people are apt to suppose. It is, of course, generally known that without a proper air supply fuel will not burn; but the operation of the air in laying up the supply of fuel in the first place is by no means so well understood. One ton of average fuel takes three tons of air to burn it; and therefore its vegetable origins, decomposing carbonic acid and water by the power of sunlight, gave three tons of oxygen to the atmosphere for every ton of combustible residue they left behind. Since it is probable that all the oxygen of our atmosphere came from primeval vegetation, the quantity of oxygen in the air gives roughly the amount of fuel that exists upon the earth. This Lord Kelvin takes at 340 million million tons, of which Great Britain possesses considerably more than its fair proportion, according to the land area. There is much fascination about these computations of the amount of the world's coal capital, arising from the known fact that we are constantly drawing upon it, and that, so far as we know, there is never any addition made to the credit balance. As Dr. Oliver Wendell Holmes long ago pointed out, however, there is plenty of coal yet left in the earth; and it is inconceivable there should be any fundamental alteration of the way in which human destiny is being worked out until all this fuel is used up. And just as there is still a good store of coal, so there is plenty of energy in the sun, though he, like the coal, is giving out by degrees. Professor Fitzgerald finds that the energy of the sun is sufficient to keep alive five persons on every square metre of the earth's surface; so that there is no reason to fear cessation of life on account of any proximate diminution of solar energy. So this is all right. There is plenty of coal; and the sun is to be relied upon as fully as ever. Working humanity, therefore, need not refrain yet awhile from taking off its coat and setting to do whatsoever task lies next its hand through fear that the last long night is coming on.

Petroleum Fires and Explosions.

IN view of the practical importance to many gas undertakings of reliable information respecting the safe storage of petroleum, the recently issued report of Her Majesty's Inspectors of Explosives, dealt with in another column, may be commended to the notice of gas managers. The Inspectors take account of petroleum accidents, several examples of which kind of casualty they describe with praiseworthy regard to detail. Two only of these mishaps can be mentioned here; but they are each typical. One was the total destruction by fire on Jan. 24, 1896, of the oil-gas works of the London, Brighton, and South Coast Railway Company, at New Cross. Here the store of gas-oil was kept in elevated tanks, carried on wooden bearers. There was about 3000 gallons of oil in these tanks on the day, and in addition there was in the vicinity an above-ground tar-tank containing 4000 gallons. "The

"accident was supposed to have been caused by a work-"man throwing down a lighted match on an oil-saturated "concrete floor." A curious origin for a gas-works fire, even if the establishment was designed and controlled by "amateurs." Anyhow, when the fire started it found everything disposed for it to do the greatest amount of damage in the shortest possible time. It took hold of the oil-saturated bearers of the tanks, and promptly let the latter down; covering the ground with a lake of flame. The gas in the holder took fire, but not explosively; and the tar-tank cracked and contributed its quota to the food for the flames, which had to be left to burn themselves out. One man was caught and severely burnt; but there was no loss of life—fortunately for all concerned. How would the question of "contributory negli-"gence" be answered in a case of this kind? The second accident was the firing of the Anglo-American Company's oil depôt at Huddersfield on Oct. 9. This was an example of a careful disposition of plant nullified to some extent by careless working, yet justified in the main by the restriction of the damage done. Oil was stored in three old boilers, placed side by side in an excavation 4 feet deep, which was surrounded by a wall. The tanks were partly full of burning oils of different qualities, with flash-points varying from 74° to 104° Fahr. The only connection with their interior was by combined suction and delivery pipes passing through the top. So far, all seemed well, save that the pipes "fitted loosely" in the holes through which they passed into the boilers. Unhappily, a new oil-tank of the vertical cylindrical shape familiar in this connection was being riveted up adjacent to the old boilers, and on the fateful day a railway tank-waggon was being discharged into one of the latter. The work was not properly looked after; the tank overflowed, and some oil ran out upon the ground. A gale of wind was blowing, and a handful of red-hot ash was driven from the riveter's forge into the pool of oil. The result was catastrophic. More than 7000 gallons of oil took fire, but did no injury beyond a distance of 30 yards from the enclosure. One tank did not take fire at all; but its contents were boiled down until they only flashed at 142° Fahr., and shrank very considerably in bulk. There are several "morals" to this story; but they hardly require pointing here, as they proclaim themselves.

The Death-Roll of the Lamp.

Public attention has once more been drawn to the dangers of petroleum oil-lamps by the annual report of Mr. A. Spencer, the Chief Officer of the Public Control Department of the London County Council. During the past municipal year, the Inspectors of the County Council investigated 370 accidents due to these lamps; 33 of them being fatal. Forty persons met their death in London alone last year from this cause. It is worth while to ponder these figures, and bear them in mind when people talk, as they sometimes do, about the dangers of other methods of lighting. What would be said of Gas Companies if they were chargeable with the death of twenty persons a year? It is stated that in the fatal cases alone—not to mention the others—two-thirds of the lamps used had glass reservoirs. Commenting upon this observation, the "Daily Graphic" "gathers that there is as yet no suffi-"cient growth of common prudence to induce the public "not to purchase such dangerous articles of domestic "furniture." But there are notoriously two sides even to the question of whether glass reservoirs should be permitted for oil-lamps. There is much to be said for the view which is strongly held in the lamp trade, that glass reservoirs can be made strong enough for anything; while they have the advantage of showing where the oil is, and do not get so hot as the thin metal, which is the only alternative material. Besides, the metal reservoirs "sweat," lose colour, and by their opacity and heavy appearance convey an impression of strength and staunchness which is not always justified. The "Daily Graphic" believes that the number of lamp accidents will never be greatly reduced "until legislation makes it imperative that every lamp "shall be marked with an official stamp guaranteeing its "safety." This is regular "crowner's quest" wisdom. The suggestion is a perfectly idle one; because it takes no account of the treatment of so-called safe lamps by the users. As a matter of fact, every oil-lamp that is sent out from a shop is perfectly safe for use under certain conditions. The margin of safety is doubtless wider in the case of some lamps than with others; but we suspect that the kind of treatment that suffices to render a lamp unsafe in one instance could not be carried much farther in any case without seriously trenching on the margin. The best way to prevent the dangers of oil lighting will be found in the extension of popular gas lighting; for it is among the class of householders to whom the prepayment gas-meter appeals that the deadly oil finds most of its victims. Oil-lamps would be harmless enough if they were always up out of the way, like the gas-burner. It is because they are literally always at one's elbow, as we have remarked before, that they meet with so many accidents; and the grave character of a large proportion of them proceeds from the same circumstance. Though the death-roll of the lamp is sadly long, the marvel is that it is not much longer, having regard to the enormous modern extension of good interior lighting among the poor, who were once content with tallow dips.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 494.)

Business was naturally quiet enough last week on the Stock Exchange; and the settlement (which was adjusted without any difficulties cropping up) occupied most attention. There was rather a tendency towards fluctuation throughout the week. At first things ruled pretty steady; then they became overcast, and dulness was the characteristic; then again they rallied and became brighter. The dark view taken with regard to the Indian frontier trouble was the chief agent of depression; and a rise in the value of money was responsible for lower prices in the gilt-edged class specially within its influence. The Money Market profited by a fair demand from the Stock Exchange; and rates were a good deal healthier than they have ruled for some time. Business in Gas securities was well up to the level that might be expected in the dull season; and it was not wholly confined to the heavier issues, which are almost always being dealt in to some extent. In Gaslights, the "A" stock was particularly brisk and in good favour. On Tuesday, it was done as low as 313½. But then it turned; and it rose so smartly that on Thursday 319 was marked more than once. The closing figures were steady, though scarcely so good. Not much was effected in the secured issues; but the "J" 10 per cent. was done as high as 320. South Metropolitan was more active, and was firm; touching 148. Very little was done in Commercials; but the old stock fetched 347 more than once. Transactions in the Suburban and Provincial division were again much restricted; but the prevailing strength was shown by the advances scored on *ex div.* variations. Brentford, Bristol, Bromley, and Croydon were conspicuous in this respect. The Continental Companies were also in good odour; and Imperial and Union both came out better at the end of the week. The rest offer nothing calling for special notice. The Water Companies had a very quiet time; and transactions were extremely limited. But all ruled firm, while some advanced their quotations.

The daily operations were: On the opening day business in Gas was exceedingly quiet; but firmness was the rule. Continental Union preference rose 2; and Imperial, 1. In Water, Kent advanced 2; and West Middlesex, 1. Business was considerably more brisk on Tuesday, and higher prices were made. Gaslight "A" advanced 1; and Imperial, 3. In Water, Lambeth tens rose 1; and ditto 7½ per cent., 3. Wednesday was a much quieter day; but Gaslight "A" pushed up with another rise of 3. The same tendency ruled on Thursday, when Gaslight "A" gained 1 more. In Water, New River rose 2. Business continued well up to the mark on Friday. Imperial 3½ per cent. debenture improved 1. Even Saturday was more active than the average Saturday; but quotations closed without further variation.

ELECTRIC LIGHTING MEMORANDA.

A New Electrical Cab Service for London—A Comment on the "Engineer" Competition—Cab v. Tramcar Driving—The Tractive Effort—Description of the Cabs.

During the last fortnight, wayfarers in the principal London thoroughfares have had occasional glimpses of a horseless vehicle of striking appearance, the passage of which among the other road traffic has been attended with much jangling of a peculiarly inharmonious bell. A moment's reflection convinces one that this must be one of the London Electrical Cab Company's "machines"—to use the Scottish locution, which is particularly applicable in this case—which were "inaugurated" on the 19th inst. by Mr. W. H. Preece. Naturally, the occasion was made a great deal of by some of the electrical and mechanical journals; but there was not quite so blatant a fanfare over it in the newspapers as previous performances of electric motor cars have evoked. Possibly even newspaper reporters and sub-

editors are beginning to remember something of the history of the application of electricity to the propulsion of road carriages, and are accordingly shy of taking "send offs" and "trial runs" at the organizers' valuation, however praiseworthy the luncheon. The fact, however, that some of the new electrically-driven cabs have actually got into the streets, and have been observed negotiating with apparent ease and at a reasonable speed the perilous ascent of Queen Victoria Street at the Blackfriars end, is to be placed to the credit of the latest adventures. Whether or not the vehicles are actually plying for hire and are being patronized by the general public we cannot say. Such, however, is stated to be the Company's programme; and again we have nothing but praise for so fair and above-board a scheme of operations.

It may be thought that the actual realization in this way of the electric cab is a surprise, after all that has been written and said concerning the inefficiency of accumulator driving for road vehicles, as demonstrated in connection with the abortive "Engineer" prize competition. The reflection is just; and we have looked to our prize-offering contemporary to see what it really thinks of the new venture. Unfortunately, although the "Engineer" published in its issue of the 20th inst. a very good illustration of the electrical cab, with its driver "up," and gave a tolerably faithful description of the arrangements, not a word was said about the whole thing in the light of a practical criticism upon the reliability of the conclusions deduced so short a time before from the Crystal Palace *fiasco*. Is it to be understood from this that the Electrical Cab Company have bye-passed the "Engineer" competition, and succeeded in achieving in their own way what was so authoritatively declared to be impracticable?

Let us examine the facts a little more closely. Assuming from the circumstance of the cabs being seen in the streets that an initial success has been achieved by the Company, what are the conditions that have enabled this to be done, and how do they differ from those that brought previous attempts to grief? The answer of the advisers of the new Company is that there is all the difference in the world between the working (say) of a tramcar and a cab. The official explanation is that, owing to the small space available on an electrical tramcar for the accommodation of the cells, the proportional weight of the latter to that of the car can only be comparatively small—say, in the Birmingham example, the accumulators weigh 2½ tons out of a total weight of 13 tons including passengers. Hence, in such circumstances, the cells must be discharged at a higher rate than the normal, with consequent rapid deterioration. It can be easily understood, moreover, that the reserve of power in such a case is small; and that the heavier and larger the vehicle, the greater the difficulty of carrying a sufficient store of accumulators. In the case of cabs, such as those now in question, the accumulators weigh 14 cwt. out of a total weight, including passengers, of (say) 30 cwt. The practical question which the Cab Company had to solve was whether such a weight of accumulators was competent to enable the vehicle carrying it to keep the streets for a sufficient period, doing the ordinary service of a hackney carriage.

This question is claimed to have been answered in the affirmative. Early experiments made by the Company to determine the energy required to propel the road vehicle on ordinary rubber tyres, showed that the tractive effort on wooden pavements barely exceeds that of a tramcar running on rails; and even on an ordinary hard and clean macadamized road such as exists within the London district, the energy taken is not much greater. When, however, it is a case of heavy roads with thick mud, such as are to be encountered in the country—to say nothing of hills—the tractive effort is very greatly increased; and the Company, therefore, which maintains that it is perfectly practicable to run electrical vehicles in the streets of London, or other well-paved and fairly level towns, with commercial success, do not suggest that the same holds good of vehicles to be used on country roads. In this limitation will probably be found the secret of the Company's success, if success eventually crowns their enterprise. Obviously, there is no earthly reason why the test of being able to run easily and cheaply from London to Brighton on a wet winter's day should be applied to a vehicle intended to do hack work upon wood, asphalte, granite setts, or such macadam as that of the Thames Embankment.

The initial question of tractive effort being settled, the adaptation of the motive power to the driving-wheels becomes a matter of detail. The cabs do not differ in form from an ordinary carriage of the same class; the driver sitting on the box just as though he had a horse to drive. This has a weird appearance, because the horse is very conspicuous by its absence. The bottom of the cab looks heavier than usual, as it well may do since here is a tray of accumulators—out of sight, of course—but hung with double springs. The motor is of 3-horse power, geared by an endless chain to the back axle, and there are three speeds—three, seven, and nine miles an hour, at the command of the driver. The Company take their electricity as a "day load" from the London Electric Supply Company; and a fully-charged set of cells will drive the cab 50 miles. One charge a day will therefore be sufficient. As the cabs are built, there would be no difficulty nor anything to attract attention in putting in a horse, to take them home, in the event of their getting stranded for current in an out-of-the-way locality.

NOXIOUS AIR IN PURIFYING HOUSES.

THE unpleasant odours which pervade the purifying and revivifying houses of gas-works give support to the belief that the work of the purifying gang is specially injurious to the health of its members. It is certainly true that the eyes suffer—temporarily at least—from the ammonia which is frequently evolved from freshly opened vessels, and that slight cases of "gassing" occasionally occur; but there is no substantial evidence of permanent injury to the workers. Nevertheless, agitation has lately been rife at the Berlin Municipal Gas-Works; and a favourite item in the programme of the Social-democratic leaders in the city has been the harmful character of the tasks performed by gas-workers in the purifying houses. The conclusion is frequently drawn by the ignorant that a malodorous atmosphere is necessarily poisonous; and the labour agitators at Berlin did not trouble to test the truth of their hasty assertions in regard to the odours of gas-works. The assertions have, however, now met with the most decisive refutation at the hands of Herr H. Drehschmidt, the Chemist at the Berlin Gas-Works, an abstract of whose conclusion appears elsewhere to-day, p. 480.

Careful examination of the air breathed under ordinary conditions by the workers in the purifying and revivifying houses, has revealed the fact that poisonous gases are found there in quantities much below what constitutes a toxic or harmful dose. The conditions in many English gas-works are different to those at Berlin; and oxide of iron purification, which alone has been dealt with by Herr Drehschmidt, plays a comparatively subsidiary part in some of our largest works. The toxic properties of the gases evolved from spent lime cannot be more marked than those of the gases examined at Berlin; and the quantity is not likely to be greater. It is true that, under some systems of sulphur purification, peculiarly offensive "blue billy" is formed; but its odour is due chiefly to sulphur compounds which, according to authorities on hygiene, are less poisonous ingredients of the atmosphere than hydrocyanic acid and carbonic oxide. In fact, so far as coal gas is concerned, the results obtained by Herr Drehschmidt for oxide purification may be taken to apply generally to all common systems. The methods of examining the air in purifying houses adopted by the Berlin Chemist may be advantageously pursued by persons who wish to push the inquiry further; and therefore we have given from the "Journal für Gasbeleuchtung" a summary of his analytical methods, as well as the results obtained. In some London works, the purifying gang is, during the winter months, hard pushed to keep pace with the work required of it. The work is at times most laborious, and offensive to the eyes, nose, and person. Yet grumblings are few; and the gang can be relied upon to meet sudden calls upon it for extra toil. Payment by piece-work perhaps goes far to allay discontent; for during a heavy week men may earn nearly £4 per head. These extremely high weekly earnings by men who are merely labourers of good physique, are admitted by those who have watched the amount of work accomplished to be thoroughly well deserved. Complaint is really seldom made of the gases evolved from foul material, or, indeed, of the dry, fine dusty lime which is sometimes found in the vessels. Under certain conditions, foul Weldon mud has to be removed in a very wet and sloppy state; and on this score complaints have been heard. But such mud is remarkably free from evil odours, and has never been charged with emitting poisonous gases. The work of the men employed in the coal-gas purifying houses is admittedly unpleasant; but in this country at least it is generally well remunerated, and no real injury to health has yet been brought home to it.

Herr Drehschmidt had not to consider the analogous case of water-gas purification, because carburetted water gas is not made at the Berlin works. But in many English works the question of possible injury to the health of men employed in emptying water-gas purifiers must have arisen; and there is certainly good ground for some anxiety. In coal-gas purifiers, shortly after opening, Herr Drehschmidt found a percentage of carbonic oxide in the air not far below that which is admitted to cause helplessness in persons who breathe the mixture. In carburetted water-gas there is generally about five times as much carbonic oxide as there is in coal gas; and it is therefore reasonable to suppose that, at a given time after opening a water-gas purifier, the air in and above it will be contaminated with five times as much carbonic oxide as would be found with a coal-gas purifier. If this supposition be correct, the air will be charged with about 0·15 per cent. of carbonic oxide, which, according to Dr. Haldane's report to the Secretary of State for the Home Department,* appears to be nearly sufficient to produce complete helplessness and loss of consciousness. Seeing that this quantity is only an approximation, and is probably much below that which is occasionally found, it is not surprising that men engaged in discharging carburetted water-gas purifiers have at times been completely overcome, and that consciousness has been recovered with some difficulty. Works which are only now introducing carburetted water-gas plant have the benefit of the fruits of experience elsewhere; and no doubt the precaution of allowing a few hours to

* See "JOURNAL," Vol. LXIX., p. 542.

elapse before the purifying men enter a freshly opened water-gas purifier will be observed from the outset. A fatal accident, due to its non-observance, would certainly be quoted by unscrupulous persons as a proof of the danger of a supply of coal gas containing a small proportion of carburetted water gas.

It may be observed that Herr Drehschmidt has omitted to consider the toxic properties of the hydrocarbons of gas. So far as coal gas is concerned, they are perhaps rightly ignored, as their amount is small, and they are not known to be peculiarly poisonous. But the larger quantity of hydrocarbons which are found in a state of vapour in crude carburetted water gas, and are deposited as liquids by the scrubbing action of the purifying material and the grids in the purifiers, must not be forgotten. Benzene, which is a large component of this deposited hydrocarbon mixture, is known in small doses to cause giddiness and sleepiness; while larger doses produce anæsthesia. Some of the other hydrocarbons in illuminating gas have a specific toxic action; but the amount breathed by purifying men would in any case be very small. The action of the vapours of the light oil deposited from carburetted water gas is, however, very potent; and some cases of "gassing" on works appear to have been almost wholly due to these vapours. Very obstinate cases of insensibility brought about by inhaling carburetted water gas or the vapours of its liquid products have occasionally been observed. A curious feature noticed in one very serious case was the ignorance of a qualified medical man (whose assistance was sought) of the composition of water gas, and apparently also of the existence and toxic properties of carbonic oxide.

In case a gas engineer should unfortunately find himself in the awkward predicament of having to advise a medical man how to proceed in a case of "gassing" by carburetted water gas, he may be reminded that a vigorous course of artificial respiration, supplemented if possible by inhalation of pure oxygen, is most probably the best remedial measure. Once consciousness and power are restored to the victim, the final expulsion of the carbonic oxide from the hæmoglobin of the blood is slowly effected by the atmospheric oxygen. After hours of unconsciousness, and after the extremities have become quite cold, recovery has been wrought by the persistent use of artificial respiration. Undiluted carburetted water gas is far more poisonous than coal gas; but the danger of inhaling a toxic dose is almost confined to the men who discharge the purifiers. The penetrating odour of the gas should warn others; but the purifying men necessarily have to work in an atmosphere impregnated with the smell of the gas, and therefore they cannot rely for safety solely on their sense of smell. The gas engineer must see that stringent rules with regard to the proper aëration of newly-opened purifiers before men enter them, are rigidly enforced.

THE REPORT OF THE INSPECTORS OF EXPLOSIVES.

The Annual Report of Her Majesty's Inspectors of Explosives for the year 1896 has just been issued as a Blue Book; and it contains much interesting and valuable information concerning a class of substances that every year enter more largely into the trade of the country. Not only is the demand for explosives properly so called a growing one, but many of the products of modern industry and the commodities commonly sold to the people possess explosive properties which bring them under the notice of H.M. Inspectors. Prominent among these are petroleum and its compounds, together with some of the bye-products of coal-gas manufacture. Now that oil and mineral spirit are so largely used in gas-works, these establishments come within the purview of the Inspectors in a way that has only been known of late years. Consequently gas managers will be well advised to take careful note of those portions of the present report which relate to petroleum accidents. The first of these in the list was an explosion, not of petroleum, but of creosote, which resulted in the death of one man. It occurred at a brewery in the East-End of London, where a boiler furnace, which was fired by means of injected creosote, exploded. The probable cause of the accident appeared to be that the furnace was surcharged with creosote, thereby giving off an excess of vapour previous to the light being applied. The incident is not to be overlooked in connection with the often-recommended use of liquid fuel.

A remarkable conflagration occurred at the oil-gas works of the London, Brighton, and South-Coast Railway at New Cross. Here about 3000 gallons of petroleum were kept in three large iron tanks, raised on girders, and supported by boards. A workman is supposed to have thrown down a lighted match on an oil-saturated concrete floor; and a fire started which soon reached the similarly saturated boards under the oil-tanks. The tanks fell; their burning contents covering the ground over a considerable area. A tank containing 4000 gallons of tar was cracked; and the tar escaped and caught fire. The gas in the holder was also burnt. All this mischief appears to be traceable to the over-ground tanks, with no provision for securing the oil or tar in the event of an escape. A sad accident on board a vessel which had carried naphtha is made the text of some observations on the extent to which naphtha is competent to render air explosive. The public are reminded that one volume of ordinary mineral spirit will render 16,000 volumes of air inflammable, or 5000 volumes of air highly explosive. "The history of these accidents goes to show that it is really in so-called empty vessels, or at any rate in the supposed empty or non-danger spaces, that the risk may be at its maximum. Even the least instructed master of a vessel knows that to introduce fire or light into the hold of a vessel containing petroleum, or in close proximity to a tank filled with the same, or where the odour of petroleum is overpoweringly strong, is dangerous. But a very large proportion of masters, contractors, and others are ignorant of the fact that, long after the cargo has been removed, and even in the spaces where in the form of liquid petroleum has never entered—nay, even after some form of supposed cleansing has been gone through—serious risk may exist."

The death of a painter on board the Cunarder "Servia," from the explosive ignition of some "Patent Bitumastic Solution," is discussed. The paint was found to be probably a solution of coal tar in crude coal tar oil, having a flashing point of 45°. Another vessel was nearly lost through having on board some composition of a similar character, which escaped from the drums during a gale, and gave off a highly explosive vapour. A serious petroleum fire at a Hackney oil-shop is cited to illustrate, not only the necessity for placing such places under proper supervision and control, but also of the particular risk of keeping mineral oil in open vessels for serving to customers. The same observation, of course, applies to the keeping or measuring of mineral oil in the open for any purpose. The volatility of common mineral oils at ordinary temperatures is a subject not sufficiently appreciated. Professor Dewar found that, when exposed at 66° in a shallow vessel for 24 hours, American "water white" petroleum, flash-point 106°, lost 20·4 per cent. of its weight. A 75° flash-point oil, also American, lost 27·4 per cent.; and a Russian oil, of 84° flash-point, lost substantially the same. The flash-point, therefore, has no necessary connection with the volatility of the oil.

A fatal explosion of an iron-lined wooden drum that had contained benzol was caused in a dock-shed at Hull—presumably by some boys having applied a lighted match to the bung-hole. An interesting petroleum fire and explosion, conveying several lessons to those having to do with the storing of mineral oil in large quantities, took place at Huddersfield. The scene was a depôt for Anglo-American oil; and the plant consisted of three horizontal cylindrical tanks, 25 ft. 6 in. long and 6 ft. 6 in. in diameter—old boilers, in fact—which were placed side by side in a rectangular space excavated to a depth of about 4 feet below the surface of the ground, and surrounded by a substantial brick wall 4 ft. 6 in. high from the floor of the enclosure. The tanks contained in all about 9000 gallons of lamp oil, and were filled and emptied through holes in the top just large enough to admit a 2-inch pipe, the end of which reached to within 2 inches of the bottom. A new vertical cylindrical tank was being built close to the old ones; and there was a riveters' forge in dangerous proximity to one of the tanks, which was being filled from a railway tank waggon. The result was an alarming fire and explosion, the circumstances of which are related in detail in the report. Several important conclusions are drawn from the facts, mainly exhibiting the security afforded by half-sunk enclosures and the separation of tanks. A curious motor-car explosion at Whitchurch is recounted. Some interesting experiments were instituted by the Inspectors with so-called uninflammable materials for the clothing of workpeople, which appear to have yielded satisfactory results. The report is signed by Colonels Majendie and Ford and Captain Thomson.

The appendices are numerous. One of them gives *in extenso* the order of the Secretary of State defining the manner in which blasting agents are to be employed in dangerous coal mines. Only those explosives are to be used which, under reasonably practical conditions, are incapable of setting fire to inflammable gas or coal dust.

A New Form of Bunsen Burner.—During the proceedings of the Chemical Section of the British Association, at their meeting in Toronto, Dr. Hugh Marshall's new form of bunsen burner received attention. It has no central gas-jet to become choked by matter falling down the tube. The latter is open right through to the bottom; the gas being introduced through an inclined lateral opening. It is claimed that with this burner the flame can be turned down very low without striking-back, even when the air supply is not specially regulated.

A Lead Joint Remover.—The "American Gaslight Journal" for the 9th inst. contains an illustrated description of a lead joint remover which is being manufactured in New York, and by the use of which it is claimed that the time and material hitherto wasted in disconnecting heavy cast-iron pipe may be saved. The machine is made in two parts, and is designed to be clamped tightly round the pipe. It is provided with a cutter which slowly feeds into the lead in the joint as the cutter revolves, cutting off a ribbon shaving of lead at each revolution (so that it may be readily saved clean and fit for use), and severing the joint in a very short time. The machine is adapted for removing lead from gate-valves and the various fittings used on cast-iron pipe work; and it obviates all danger of destroying large valves by overheating them. It operates with very little power; and its action and application are said to be so simple that an ordinary workman can use it successfully. It is made in three sizes, for use on pipe ranging from 4 up to 16 inches in diameter.

PERSONAL.

Mr. J. Acraman has been elected Chairman of the South Australian Gas Company, in succession to Sir H. Ayres.

The vacancy on the Board of the Dover Gas Company caused by the death of Mr. E. Bottle, as announced in the "Journal" for the 17th inst., has been filled by the election of Mr. W. Thorpe; and Mr. E. M. Worsfold succeeds his late father as Auditor of the Company.

Mr. T. Watson, who is at present managing the gas-works at Gibraltar, has received the appointment of Manager of the Rushden and Higham Ferrers Gas-Works, the demands upon which have of late years very considerably increased, owing to the liberal reductions made in the price of gas by the Directors of the Company.

Mr. Prim, the Superintendent of the lighting, heating, and ventilating department of the Houses of Parliament, will retire this year. When he entered upon his duties, the ventilation of the new buildings was very faulty; and though the House of Commons itself was well lighted, the scheme of artificial illumination in the other parts of the House were most inadequate. All this is now changed.

At the works of the Whitwood Chemical Company, Limited, last Tuesday, the Engineer and Manager, Mr. Ackroyd Bower, brother of Mr. T. Bower, of Hartlepool, was the recipient of a wedding present from the workmen and officials of the Company. Mr. Bourne, who presided, congratulated Mr. Bower, and expressed the hope that he would have a long and happy life. A handsome silver salver, suitably inscribed, together with an inkstand for Mrs. Bower, was then presented by one of the foremen, who assured Mr. Bower of the good feeling existing between the workmen and the Manager, which was shown so well by the hearty co-operation of all the workmen. Mr. Bower, in acknowledging the presents, said it afforded him much satisfaction to receive such a mark of esteem from those with whom he was so closely connected; and he hoped that the mutual co-operation of the officials and workmen of the Company might long exist, as it was one of the things most necessary to ensure a successful undertaking.

OBITUARY.

Charles Roper Mead.

It is with much regret that we record the death last Friday morning, at his residence, Devon Lodge, Sutton, at the age of 77, of Mr. Charles Roper Mead, the Chairman of the Sutton Gas Company. Our readers may remember that early in April Mr. Mead sustained a great bereavement in the death of his son, Mr. Frank Mead, the Engineer of the Company; and from this it may be said he never recovered. About two months ago it became apparent that his health was giving way; and from that time he grew gradually weaker. The late Mr. Mead had a busy and eventful career. He was apprenticed to the engineering profession, and for some years held the position of Chief Constructor to Sir W. Siemens. In his young days he was sufficiently far-seeing to recognize that there was a great future before gas; and he therefore turned his attention to the branch of engineering immediately connected with it. In 1840, he erected the original gas-works at Bournemouth, and subsequently those at Reigate, Newhaven, and elsewhere. His connection with Sutton commenced in 1856, when the gas-works there were projected, and afterwards built from his designs. In this undertaking he was associated with Mr. J. Squire and Mr. C. E. Amos. The works were very small—only three retorts, capable of producing 6000 cubic feet of gas per day, with storage for 5000 feet. A Company was formed locally, and the works were leased to Mr. Squire. On his decease in 1873, the Directors took over the entire concern, and Mr. Mead was appointed Chairman. Under his able supervision, the business progressed rapidly, and the Company was brought into its present substantial position. Besides looking after the supply of gas in Sutton, Mr. Mead was Chairman of the Bournemouth Gas and Water Company, which he he had joined when the undertaking was in a very bad way. It is in a far different position now. He was also on the directorates of the Reigate, Newhaven, Hong Kong and China, and Colombo Gas Companies; and he was Engineer of several small companies. On taking up his abode at Sutton, whence he moved from Reigate about twenty years ago, he displayed considerable interest in the affairs of the town. He was elected a member of the Local Board on its formation in 1883, and became Chairman of the Highways and Works Committee. He was Chairman of the Sutton Public Hall Company, and a Director of a similar undertaking at Reigate. His capacity for business was shown in everything he undertook; while in private life he was kind-hearted and genial and a true and staunch friend. The news of his death was received with much sorrow by his personal friends and the employees at the gas-works; and the deepest sympathy is shown with the widow and family, who within a few months have suffered a double bereavement. The funeral will take place tomorrow at Sutton Cemetery.

Dr. Victor Meyer, who succeeded Bunsen as Professor of Chemistry at the University of Heidelberg, died somewhat suddenly in that city on the 7th inst. He was the discoverer of thiophene in benzene.

The death is announced of Mr. E. H. Samms, of Old Swindon, at the age of 55. He was a Director of the Old Swindon Gas Company, and quite recently was elected as the representative of the District Council on the Swindon Water Board. He was also a member of various local governing bodies.

A letter recently received from Adelaide contained news of the death of the Hon. Sir H. Ayres, G.C.M.G., the Chairman of the South Australian Gas Company, at the age of 76. Deceased was one of the promoters of the Company; and he had been a Director from the formation of the undertaking in 1861.

We regret to record the rather sudden death, last Tuesday week, of Mr. John S. Riggs, Chairman of the Armagh Gas Company. Deceased, who was 81 years of age, was present at the meeting of the Board on the 12th inst., when it was noticed that he was looking better than he had done for some time.

NOTES.

Description of an Unknown Gas.

In his presidential address to the Chemical Section of the British Association, Professor William Ramsay described a new gas, the chief peculiarity of which is that it is not known to exist. Nothing answering to the description has yet been discovered. It is still unborn, and has consequently not been named. Notwithstanding this initial difficulty, Professor Ramsay was not at a loss to define the properties of the gas and its place in the scale of the elements. The latter is determined by the periodic law. The discovery of argon by Lord Rayleigh and Professor Ramsay became at once a test of this law, after the actuality of the new element had been established beyond the reach of cavil. It was by no means easy to fit argon into the atomic table; and this had hardly been done when the discovery of helium threw new light on the subject. Helium and argon came as "outsiders" to the established order of the elements; and when their properties were settled, it was perceived that there is room between them for another element of like character in some respects. Mr. Morris Travers has aided Professor Ramsay in the search for the unknown gas, to which the proverbial hunt for a needle in a bundle of hay was as nothing. "Modern science, with the aid of suitable magnetic appliances, would, if the reward were sufficient, make short work of that proverbial needle. But here is a supposed unknown gas, endowed, no doubt, with negative properties, and the whole world to find it in." Minerals, the air of natural hot springs, and other possible sources of the new and strange in Nature were probed in vain. Then samples of argon and helium were treated by diffusion, to find if they were associated with the unknown gas, but without positive result. Professor Ramsay's speculations on the quest, however, carry him to the very essence of the old philosophical question of the existence of "matter."

Profits of the German Coal-Tar Colour Industry.

According to a statement of Dr. Otto N. Witt, President of the German Society for the Protection of Chemical Interests, the chemical industries of Germany are in a generally prosperous condition. None of them, however, pays so well as the coal-tar colour manufacture; the average dividends declared in this trade between 1886 and 1895 being 19·2 per cent. The average dividend of the coal-tar dye industry has increased without a break, and with remarkable equality, since 1886. In that year, the average was not quite 10 per cent.; in 1891, it was upwards of 20 per cent.; and between 1892 and 1895, it has been 23·45 per cent. Unfortunately, there are no means of showing what proportion of this increased profit belongs to the coal-tar remedies, which are now made at most of the coal-tar products factories with at least as much assiduity as the manufacture of colours. On the other hand, it is asserted that the burdens on the industry, in consequence of enforced contributions towards the insurance of workmen, &c., are increasing every year. Wages have also risen considerably since 1886; so that, for one reason and another, the advantage of cheap labour hitherto enjoyed by the chemical industry of Germany tends to disappear, and the time is approaching when the skill of German chemists alone will avail to retain this lucrative trade in the country. It will then appear whether or not the vaunted superiority of German technical training is really good for anything at all.

A Water-Sampling Bottle.

Mr. J. T. Rodda, of the Eastbourne Water-Works, has devised an ingenious attachment for water-sampling bottles, which greatly increases the ease of sampling reservoirs and streams, and secures more reliable samples. It is understood that considerable care must be taken in collecting samples of water for analysis; but circumstances often conspire to defeat the collector's efforts, even when he is fully aware of the importance of the operation. Many samples are taken by simply plunging the bottle a few inches below the surface of the water; or a bucket is used, and the surface water dipped up. The proper bottles for taking samples of water for analysis are the stock size Winchester quarts; and Mr. Rodda's device consists of a brass wire cage for a bottle of this description. The cage with the bottle is gently lowered to the required depth in the well or reservoir

where a float disengages the glass stopper and allows the bottle to fill. The action of drawing up the bottle causes the stopper to fall back into its place; thus preventing any contamination from water above the level at which the sample was taken. The float is provided with a detachable chain with swivel attachments for the float at every 12 inches of depth. In the case of taking a sample of water from a shallow stream, the bottle is immersed on its side, the clip withdraws the stopper; and when the bottle is full the stopper is replaced under water, so that the sample is taken as fairly as possible, without the stopper being handled.

A Method of Consolidating Bad Foundations.

In connection with the preparations for the Paris Exhibition of 1900, "Engineering" describes a novel device of M. Dulac for consolidating the made-ground on the banks of the Seine, so as to enable it to bear heavy buildings. It was required to erect a new office building upon a site where the preponderance of fine sand in the made-ground renders the latter particularly unsuitable for foundations. In this emergency, the aid of M. Dulac was invoked. This engineer some time since acquired a plot of made-ground very cheaply, because it was considered unsuitable for building purpose; and he proceeded to erect upon it some heavy factories, including a chimney 30 metres high. The ground had been made up of all sorts of rough filling to a depth of 16 metres; and M. Dulac treated it by punching the surface all over by means of a pile-driver armed with a conical punch, weighing about 30 cwt., falling freely from a height of 10 to 12 metres. This punch is 31 inches diameter at its thickest end, and penetrates the loose soil 20 inches at a blow. When a depth of about 12 metres has been reached in this way, the hole is filled in by degrees with hard core and concrete in alternate layers, which are rammed by a modified form of the same kind of tool. These holes are spaced about 6 feet apart, centre to centre, according to the nature of the ground and the weight to be put upon it. In his own case, M. Dulac was able to construct buildings giving a load of 4 tons per foot upon ground which would not previously carry one-tenth the weight. He has also erected a building weighing 8 tons per square foot upon land where the first fall of the boring tool threw up a jet of semi-fluid mud to a height of 30 feet.

Eastern Counties Gas Managers' Association.—The eighteenth general meeting of the Association will be held at Ipswich on the 9th prox., under the presidency of Mr. J. T. Jolliffe, the Engineer and Secretary of the Ipswich Gas Company. We learn from the programme issued by the Hon. Secretary and Treasurer (Mr. J. H. Troughton, of Newmarket) that one member will be proposed for election, and that two papers will be presented—one by Mr. W. J. Carpenter, Assoc.M.Inst.C.E., on "Electricity and Gas at Great Yarmouth;" the other by Mr. F. Prentice, on "Experiences with Regenerative Firing." At the close of the business, the members and friends will be invited by the President to take a steamboat excursion down the Orwell, with a possible short trip to sea, should the weather be favourable. On their return, they will dine in the Council Chamber of the Town Hall, at the invitation of the Chairman and Directors of the Ipswich Gas Company.

Measurement of the Evaporation of Water.—Mr. E. Kinchling, the Chief Engineer of the Water Department at Rochester (N.Y.), has devised an apparatus for measuring evaporation of water during the warmer months. It consists essentially of a small timber raft, or floating platform, and two indurated fibre tubs, about 15 inches in diameter and 5¾ inches deep, in each of which an accurately measured volume of water, taken directly from the reservoir, is placed. During the open season, one of these tubs is freely exposed on the raft, while the other is floated in a large square opening in the middle of the raft, and held in place by cords. The deep timbers which surround this central opening are almost fully submerged, and thus prevent any appreciable agitation of the enclosed water and tub. At the end of every 24 hours, the water left in each tub is carefully measured; and the tubs are then refilled with fresh water. In case of rainfall, the depth of the precipitation is determined from a 9 inch rain-gauge immediately after its cessation, and proper allowance is made therefor in computing the loss by evaporation.

Improvements in the Fredureau Globes.—Though the great value of these globes as light-diffusing agents has been acknowledged by all who have tried them, it has been found that there were certain obstacles to their more general use which it has been necessary to overcome. One of the greatest of these was the weight of the globes; but we learn that the makers have succeeded in reducing this by more than 50 per cent. Another defect was the visibility of the sections of the globes; but we understand this will henceforth be almost entirely removed by the employment of very highly-finished moulds and improved methods of production, so that the absolute accuracy of the prisms may be guaranteed. Without in any way interfering with the scientific principles upon which the globes are constructed, some new and original designs have been produced; while, as the result of considerable experiment, the rose and primrose colours have been specially selected for tinting, with the view of combining artistic effect with a healthy tone for the eyes. The manufacture of the globes has been entrusted to one of the largest and best equipped glass-works in the country.

TECHNICAL RECORD.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

Quarterly Meeting at Elland.

Two very gratifying features characterized the proceedings at the one-hundred-and-eleventh quarterly meeting of the Manchester District Institution of Gas Engineers, which was held at Elland last Saturday. These were, first of all, the considerable addition made to the roll of members—no less than twelve new members being admitted; and, secondly, the large number of members and friends of the Institution who journeyed to the President's professional home in order by their presence to testify to the popularity of Mr. Robert Porter with those who have the best interests of the Institution at heart.

By 11 o'clock the party had already begun to assemble; and there was a goodly gathering on Elland railway platform when the train from Manchester shortly afterwards arrived. On reaching the gas-works, which are only a short distance from the station, light refreshments were served; and subsequently the board-room was filled to overflowing, while Mr. J. Dodgson, the Chairman of the Elland Gas Company, offered a few hearty words of welcome to the town, and of appreciation of the services rendered to the Company by Mr. Porter since his appointment as Manager.

A visit of inspection was then made to the works; and to facilitate a due appreciation of what was to be seen, Mr. Porter had prepared in the form of an address, and handed to each member, a general description of the plant. This is given below; and it is supplemented, on p. 481, by some illustrated particulars of the coal-handling appliances which first engaged the attention of the party. After an hour spent about the works, an adjournment was made to the Town Hall, where the luncheon was served for which the Chairman and Directors of the Gas Company had issued invitations. The head of the table was taken by the Rev. G. Aspinall, a member of the Board; and he was supported by the Chairman of the Company and Mr. Porter. Suitable acknowledgment of the interest shown in the proceedings by the Company was afterwards made by the adoption by acclamation of a resolution of thanks proposed by Mr. Thomas Newbigging, and seconded by Mr. W. R. Chester. The vote was duly acknowledged by the Vice-Chairman of the Company, Mr. Thornton.

It was already past 2 o'clock before a move was made for the brakes which were in readiness to convey the party for a drive through Stainland to Ripponden and Sowerby Bridge—reaching Elland on the return journey soon after 5 o'clock. This part of the proceedings was much appreciated, and was a thoroughly enjoyable feature of the day's outing.

After tea in the town hall, the brief formal business meeting that had been arranged for—two items only—was held. The minutes of the last meeting, at Chester, having been read by the Hon. Secretary (Mr. S. S. Mellor), and duly confirmed, the nominations for membership of the Institution from the following gentlemen were agreed to:—

Mr. John Andrews	Langley Mill.
Mr. W. H. Burtonshaw	Skipton.
Mr. Benjamin Ely	Pye Bridge.
Mr. John E. Hall	Prescot.
Mr. Charles Harrison	Accrington.
Mr. Richard Hooton	Ashton-under-Lyne.
Mr. Fred. Lee	Marsden.
Mr. John Marsland	Sowerby Bridge.
Mr. Robert Midgley	Milnsbridge.
Mr. C. B. Newton	Carlisle.
Mr. George Niven	Cleckheaton.
Mr. J. C. Pennington	Colwyn Bay.

The time for the return journey had by this time almost arrived; and at the station the party broke up, well pleased with the programme arranged for them by their President, in conjunction with the members of his Board of Directors.

During the day opportunity was taken by many of the members to pay a visit of inspection to the establishment of Messrs. Robert Dempster and Sons, Limited. Here they were received by the Manager (Mr. J. W. Broadhead), and shown over the extensive Rose Mount Engineering Works that have been so well known, by name at all events, to members of the gas profession since the time when (as mentioned by Mr. Porter in his address) the founder of the firm was himself the Gas Manager at Elland. Considerable interest was evinced in the work under progress—the Company being at the present time exceptionally busy.

In connection with the meeting, Mr. and Mrs. Porter invited all the workmen on the staff to a supper last night, and a very pleasant evening was spent.

A DESCRIPTIVE SKETCH OF THE ELLAND-CUM-GREETLAND GAS UNDERTAKING.

Gentlemen,—In welcoming you to Elland to-day, I do so with the greatest cordiality, knowing full well that a visit to Elland must always be of interest to gas engineers on account of its associations with the development of the gas industry

generally, apart from anything connected with the gas undertaking here which you may deem worthy of notice.

The name of Dempster and Elland are to the gas profession synonymous terms; and to touch upon anything pertaining to gas matters in Elland without associating with it the name of Dempster, would be an omission not easily condoned. In fact, the progress and success of the gas undertaking here may be said to date from the time of Mr. Robert Dempster's appointment to the post of Manager to these works on April 27, 1855. Prior to Mr. Dempster's appointment, the Gas Company had let their works on a lease, with most unsatisfactory results to shareholder and consumer alike; and, in the interest of all concerned, the Company decided to conduct their works themselves—Mr. Dempster being the first Manager appointed under the new *régime*. It was while managing the Elland Gas-Works that Mr. Dempster undertook to act as Consulting Engineer to various smaller works in the neighbourhood; and doubtless this was one step which led him to join Messrs. Butterworth and Bently as gas-works constructors—afterwards dissolving partnership, and commencing on his own account with the assistance of local foundries. These, however, were in time displaced by the Rose Mount Foundry, established by Mr. Dempster, and from which has grown the Rose Mount Engineering Works as they exist to-day. As you are all aware, a large proportion of gas engineering works has been carried out in all parts of the world from these works; and not a few members of our own profession have received the technical part of their training there. Incidentally, I may say it was from these engineering works that the great impetus was given to the establishment of carbonizing residuals works, and, later, to the extracting of residuals from blast-furnace gases and coke-ovens.

To return to the time the Gas Company decided to manage their own affairs. They commenced operations by reducing the price of gas from 7s. 6d. to 5s. per 1000 cubic feet, with the following discounts:—

On amounts of	£5	to	£10 per annum	2½	per cent.
,,	10	,,	20 ,,	5	,,
,,	20	,,	40 ,,	7½	,,
,,	40	,,	60 ,,	10	,,
,,	60	,,	80 ,,	20	,,
,,	80	and upwards	,,	25	,,

Thereby adopting the policy of cheap gas, which has been consistently adhered to ever since.

It may be interesting to know that these works were established in the year 1837. Consequently this is our Diamond Jubilee Year.

Coming to the present time. The annual make of gas is 90 million cubic feet; and, to some of you this may appear a small make in comparison with the dimensions of the works. But let it be borne in mind that we have a large reserve at our disposal; and local conditions as to irregularity of demand between one season and another, and the great difference between the maximum and minimum requirements of any one year—not to mention our liability to be called upon to lend a hand to our friend the electric light when in difficulties (for it is no uncommon occurrence to have a large mill switched on during the depth of winter, owing to a failure of the electric light)—demand a state of readiness to meet emergencies which would be of advantage at places other than Elland.

As every gas engineer is aware, the handling of raw material is largely affected by conditions peculiar to each works; and these are factors which must not be ignored when arranging to deal with such. Perhaps the first inquiry dictated by the observant mind will be, "How is it that, with the railway running practically overhead, you elect to carry your coal by canal, and have it delivered at a low level?" It is a case of being "so near and yet so far." For with railway companies, the nearest cut is often the longest—at any rate in price; and it is purely owing to financial considerations that in this instance canal carriage is preferred to that by rail.

As will be seen from the accompanying illustration,* the chief objection to canal carriage—viz., that of unloading—has been overcome by specially designed elevator and conveyors; while the same, and, if required, deeper storage can be obtained by this means than by overhead lines, and without extra cost for stacking. There are many forms of elevators; but the writer ventures to think that this application of the elevator is unique, at any rate in connection with coal handling.

The first noticeable feature of the elevator is that it deals with coal as it comes from the pit without having previously passed through a breaker; the coal being fed into a hopper provided at the bottom of the trunk, as shown. The elevating machinery, and the conveyor band across the tow path, had to be so arranged as to rise and fall automatically with the barge, and to be moved out, or in, across the tow path, as it is necessary to leave the tow path clear and unobstructed, both while unloading and when in disuse. These conditions involved the application of special arrangements for hoisting and travelling motions. The apparatus consists of a vertical trunk suspended by chains, and attached to a pair of steel travelling beams. The top of the elevator casing is stiffened for carrying the driving gear; and the bottom part is provided with a suitable hopper and tightening gear. The trunk is maintained in a vertical position by cast-iron guides with anti-friction rollers top and bottom.

* See p. 481.

The elevator proper is of the chain and bucket type. Special hoisting arrangements effect the raising and lowering of the trunk according to the position of the barge. The carriage supporting the elevator is, as before mentioned, of steel joists, strongly trussed, and provided with top and bottom anti-friction rollers; and it is propelled backwards and forwards by power conducted from the main driving-shaft by open and crossed belts, and thence by a large screw working in a phosphor-bronze nut fitted into the end stay.

The hoisting gear is driven from the top shaft of the elevator, and means are also provided for raising or lowering the elevator by hand if required. The coal is delivered from the elevator top through a suitable discharging head, over an inclined shoot on to an endless inclined travelling band across the tow path, to the long endless band travelling at right angles situate in, and running the entire length of, the coal-store. The cross band is provided with a weighted arrangement, which automatically adjusts the band to any position of the elevator, and maintains a constant tension in addition. The long band is supported at intervals on suitable rollers, and is fitted with a moveable throw-off carriage, so arranged that coal can be delivered at any point and from either side.

The power is obtained from a 12-horse power horizontal engine fixed at the elevator end of the coal-store. The apparatus can be started and stopped by an unskilled attendant with ease, and is capable of dealing with 20 tons of coal per hour. Storage is provided for 50 days' maximum consumption.

Labour troubles are not unknown in this part of Yorkshire. In fact, it was principally to meet the inconvenience arising from this source that machinery was introduced when retort-house alterations became necessary. Here may be seen in the one house, one bench of retorts set on the old direct-fired system (these act as a reserve force, to be called upon under stress of circumstances only), and the more recently erected bench set on the generator principle and accompanied by manual stoking machinery. The generating capacity of the newer bench is 512,000 cubic feet per day; and that of the old one, 288,000 cubic feet. This gives us a maximum producing power of 800,000 cubic feet per day if required, although at present the new bench meets all demands. The daily maximum make last winter was 460,000 cubic feet.

The question of condensation is one which is dealt with in a variety of ways. At Elland, we are content to deal with it in what appears to us to be the most natural manner—*i.e.*, to allow the gases in the early stages of condensation to move slowly and cool gradually. We effect this, in the first instance, by means of a 22-inch diameter wrought-iron foul-main running behind the new bench, and its entire length—afterwards emerging into the open air and finishing in a battery of atmospheric annular condensers, capable of dealing with 750,000 cubic feet per day.

Our scrubbing efficiency is at the present time equal to 600,000 cubic feet per diem, although by extending the scrubbers to the normal height (another 20 feet) we could deal with 800,000 cubic feet per day.

The exhausting machinery is more than ample for present requirements. It consists of two belt-driven exhausters of the three-blade type, capable of passing 20,000 and 30,000 cubic feet per hour respectively (maker's estimate).

Like most other parts of our plant, the purifying apparatus is well above its work. The boxes are so arranged as to enable us to work the whole six on at once, or five on and one off, or four on and two off. The total working capacity of the purifiers is 750,000 cubic feet a day for thoroughly efficient purification.

A 60,000 cubic feet per hour station meter completes the plant on the manufacturing side of the gasholder, and is, so far as one can judge, likely to serve our purpose for some considerable time to come.

I might here observe that what in too many instances is the weakest part of the works—viz., storage—is our strongest feature. Our total gasholder accommodation is equal to 1,100,000 cubic feet, while the maximum day's output so far as been 600,000 cubic feet.

Benefiting by the experience of others who have been unfortunately visited by explosions in their tar and liquor wells, we have taken the precaution to place our receptacle for these liquids as far as possible from the works proper—thereby reducing the risk of ignition and explosion to the minimum—although it must be confessed that, in the event of such a catastrophe occurring at Elland, the manager's quarters are sufficiently near this latent bomb to be unpleasant. But as of two evils we must choose the less, the manager, if needs be, must sacrifice himself in place of the works. One feature that may be noted is the absence of fumes arising from seal-pots, &c. These objectionable odours have been removed by the adoption of closed seal-pots, all of which are connected with a 6-inch sealed main drain running to the tar and liquor well. Not only does this arrangement remove the noxious fumes which pervade the atmosphere of most gas-works, but it tends to preserve paint, metals, &c., in a much better condition, and certainly by this means adds considerably to the appearance of the works. In addition to this, the loss of ammonia by evaporation is reduced to the minimum.

It will be noticed that the position of the works is not the most conducive to economical working. The site is practically cut up into three parts by road and railway, and especially is this felt in connection with the purifying plant, which is distributed between two houses, one on each side of the road. The large

gasholder is entirely isolated from the other parts of the works; and bounded as we are on one side by a canal, and on the other by the river, we have little choice in the direction of works' extensions. However, we have endeavoured to make the most of our position, and have, as our working results show, achieved a fair measure of success.

The district of supply is typical of the West Riding of Yorkshire, being about 15 square miles in area, with altitudes varying to the extent of 800 feet. The parts at present supplied utilize 35 miles of mains and 4220 meters. The leading mains are two in number, 24-inch and 12-inch respectively; diminishing down as required in the usual manner. The excessive pressure due to the altitudes is held in check by eight district governors, set to give a minimum pressure of 12-10ths at the outlet. The initial pressure is regulated by two station governors with 24-inch and 12-inch connections respectively. The 24-inch governor is actuated by a water-loading arrangement.

Being a manufacturing district, the difference between the maximum and minimum demands is very marked, as shown by last year's outputs—

Maximum day's output for 1896. . . .	600,000	cubic feet.
Minimum " "	90,000	"

The policy pursued in manufacturing districts must necessarily vary from that under more equable conditions; and it is, and always has been, the policy of this Company when undertaking works' alterations and extensions to look well ahead, and make ample provision for the future. The possibilities are such that we may be called upon almost at any time to provide for a greatly increased consumption. That we are well prepared to meet any increased demands of this kind, is shown by the following summary of the daily capacity of the respective apparatus:—

Total generating power . . .	800,000	cubic feet per day.
" condensing power . . .	800,000	" "
" exhausting power . . .	1,200,000	" "
" scrubbing power . . .	600,000	" "
" purifying power. . . .	750,000	" "
Capacity of station meter . .	1,500,000	" "
Gas storage	1,100,000	" "

By extending the scrubbers another 20 feet, the maximum efficiency of our works would be brought to 800,000 cubic feet per day; the present maximum daily make being 460,000 cubic feet. As the distributing plant is equally in excess of present requirements, 800,000 cubic feet of gas could be made and distributed without putting undue strain upon any part of the plant. Stated in other words, the reserve power is 77 per cent. over and above our present maximum demands.

This is a policy which I am well aware will not go unchallenged. But as "the proof of the pudding is in the eating," it may not be considered irrelevant if I give you a few figures relating to our capital account, and the selling price of gas under these conditions. The capital account of the undertaking stands at £65,373. The average selling price of gas is 2s. 4d. per 1000 cubic feet. The amount required for interest and dividend is 13·47d. per 1000 cubic feet of gas sold. As the surplus plant is brought into use by increasing demands, these figures will be reduced accordingly—to the mutual benefit of consumer and shareholder, as we are under the sliding-scale, which entitles us at the present time to a dividend of 14½ per cent., although the public benefit to the extent of an extra 2½ per cent., inasmuch as the shareholders are satisfied to take 12 per cent. only. Thus you see we are able to meet the demands peculiar to a manufacturing district, provide the enormous surplus power of almost 80 per cent., supply cheap gas, and maintain a good dividend, without being under the humiliating necessity to seek outside assistance in any shape or form, for we supply the genuine article (coal gas) unadorned and plain.

PACIFIC COAST GAS ASSOCIATION.

Fifth Annual Meeting at San Francisco.

This Meeting was held on the 20th, 21st, and 22nd ult., under the guidance of the President, Mr. T. R. Parker, of Napa (Cal.). Twenty-one new members were elected.

The President commenced his Inaugural Address by enlarging on the extent and magnitude of the gas industry, and the numerous classes of trade and labour engaged in it; and tracing its progress, he led up to the need for the highest order of technical and administrative ability in conducting its affairs. In addition to these, there was a necessity for protection against the damaging and ruinous attacks of political demagogues, who were always ready to malign and abuse corporate interests, with a view to magnifying their own local and political influence. There was need for protection against the insidious planning of conniving schemers, or professional mountebanks, who foisted their schemes on existing plants, under the threat of submitting their wares as a bid for municipal consideration—in many cases driving companies into over capitalization or unnecessary duplication of plant. As custodians of invested capital, these things demanded serious thought. They should direct influence towards the nomination of men of sterling worth and integrity, who would enact wholesome laws, to representative offices, so that a feeling of security might prevail, and corporate interests receive careful and just consideration. They must not remain silent or neglectful to honest criticism and effort to secure reasonable and impartial representation. The same would apply to their own Association, which must not be allowed to degenerate into a mutual admiration society, or an annual recreation club. With continual vigilance, they must squarely meet the issues of the times, and be sincere in their efforts to maintain equity, justice, and common sense. The President spoke highly of the recent Gas Exposition in New York; and he said he would like to see a similar enterprise in their own territory, where a great amount of interest was exhibited in the use of gas-stoves and inducements in the way of reduced rates, fixing at cost, &c., were being offered to consumers. The Welsbach light was steadily gaining in favour; but many companies who, with the idea of holding the area of illumination, had consolidated or absorbed their electric competitors, found they had assumed the maintenance of a current that, metaphorically speaking, turned a crank that revolved a medium that sharpened an edge that cut the sack that dividends used to be drawn from. After touching upon acetylene and prepayment meters, he referred to a caulking machine for setting up joints in main-pipes, which was said to do the work more effectually and more economically than was possible by hand. The importance of action in respect to a standard of dimensions and uniformity of castings for the district was next urged; and the appointment of a Committee was suggested. Referring to the duties on coal—of which California alone contributed 80 per cent. of the total paid in the States, and which were about to be increased—the President said it was a special hardship and hindrance to their progress, which should be firmly resisted.

Mr. John L. Howard, of San Francisco, read a paper on the "Spontaneous Combustion of Coal." It was proved that there was greater liability to ignition when the coal was fine and the mass deep; and with this point in mind, he reviewed the ordinary methods of loading coal-ships—showing that the mass of broken and powdered coal which accumulated under the hatchways as the cargo was loaded in, was largely responsible for accidents from this source. The larger the vessel, the deeper the hold, and the greater the degree of breakage and accumulation of fine coal. The liability to spontaneous combustion grew rapidly with increased size of cargoes; and the fine coal was frequently the cause of accidents after it had been unloaded and piled on shore. The action was due to the chemical combination of oxygen with (1) the sulphur compounds and (2) the carbonaceous parts of the coal. The sulphur theory was accepted for some time as a sufficient explanation; but the investigations of Percy in 1864 and Richters in 1870, proved that it did not account for all the discovered facts. Coals almost free from sulphur were observed to be dangerous; and others heavily charged with it, were comparatively safe. Further, the sulphur theory would not account for the ignition of charcoal or oily waste. The presence of pyrites, however, was an accessory, as it swelled when oxidizing, causing disintegration and increase of absorbing surface. It also lowered the temperature of ignition, for sulphur would ignite at 482° Fahr., whereas coal would not ignite under 700° to 900° Fahr. Richters' theory, which was generally accepted as correct, was described in detail. The gist of it is the combination of oxygen with finely-divided or powdered coal. At a low temperature, this action was slow. But it rapidly increased when 100° Fahr. was exceeded; and powdered coal had been known to fire in a few hours at a steady temperature of 250° Fahr. Under ordinary conditions, however, the absorption was in proportion to the surface exposed, to the porosity, and to the temperature of the coal. Most of these researches treated of bituminous coals only; and Professor Lewes had observed that the oxygen attacked the hydrocarbons, and had apparently but little action on the carbon. But this failed to account for the firing of anthracite coal. Welsh anthracite, as unshipped at California, yielded 10 to 25 per cent. of screenings; but some of the softer coals gave as much as 40 per cent. And this coal had to pass twice through the tropics in transit. Attention was next directed to means of preventing or minimizing this evil, which the loss of life and property in the past, and the increasing risk due to larger ships, rendered an inviting subject. The steady rise in the rates of insurance had rendered the freightage of some British coals prohibitory. Scotch splint and North Welsh steam coal were no longer carried in British ships; and many British shipowners refused to carry Wallsend from Australia. For these kinds of coal, they were dependent upon Norwegian vessels that were not subject to English insurance rules. Various mechanical arrangements for loading the coal without shock and impact had been introduced.

Discussion being invited, Mr. Eichbaum said he had known of thirty or forty fires, but not one of them occurred without the presence of wood, either in the form of chips, or in the supports. Japanese coal was frequently delivered in baskets made of grasses; and these were the nicest things to start a fire that he ever saw. Cases of woodwork being gradually converted into charcoal, and firing by contact with a steam-pipe, were known; and he had observed the same thing in coal piles. The surface of the wooden supports became charred and furry, like tinder; and he believed that, under such circumstances, it would ignite at a very low temperature. The higher the stack of coal, the greater the risk; and it would be a good plan to cover with iron plates all woodwork likely to come in contact with coal. Mr. Jones said it was often necessary to store large quantities of coal; and the

risk was to some extent unavoidable. It was a good plan to work a shed right out from time to time, or to so arrange storage as to admit of the coal being used in the same order as delivered. He had had considerable experience with Nova Scotia coal, which contained a large proportion of pyrites; and he agreed that the fires broke out in the finely-divided coal under the hatchways, or near wooden supports where there might be a current of air. At Boston, he had 2-inch pipes let into the piles of coal, so that the temperature could be taken at every part. This was done weekly; and if a rise was discovered, the heated portion was used up as soon as possible. The peculiar odour given off by spontaneous combustion was very characteristic; and when this was noticed, it was well to put on a large staff, and dig out the infected part as speedily as possible. Apart from spontaneous combustion, bituminous coal exposed to the air would deteriorate to the extent of something like 10 per cent. per annum. Mr. Britton had a pipe system similar to that mentioned by Mr. Jones, but with a 1½-inch perforation at every 3 feet of length. Mr. Holberton thought it was evident that coal should always be stored in iron buildings.

Mr. Howard, in replying, said that since handing in his paper, an inquiry had been held in Australia; and the Manager of the Melbourne Gas-Works said that in one shed he stored coal to a depth of 20 feet, and in the other to only 14 feet. They had fires in the first shed, but never in the second. He agreed that woodwork, being apt to ignite at a low temperature, was an auxiliary to spontaneous combustion. But since he adopted the plan of isolating the fine coal, he had had no fires; and he considered it the best preventative. While it would be better to use iron than wood for coal stores, the firing would not be prevented by that plan.

(To be continued.)

NOXIOUS AIR IN PURIFYING HOUSES.

In another column to-day (p. 474), there appears an article under the above heading, commenting upon some recent researches by Herr H. Drehschmidt, the Chemist of the Berlin Municipal Gas-Works; and it will be here interesting if we reproduce certain portions of the technical results arrived at by this gentleman in his investigations. It should be mentioned that the experiments with which Herr Drehschmidt deals were for the most part carried out by his assistant, Dr. Hans Wolf.

It is pointed out that the toxic constituents of coal gas are said to be: Ammonia, hydrocyanic acid, sulphuretted hydrogen, carbon disulphide, some not clearly specified gaseous sulphur compounds, and carbonic oxide. Ammonia is at Berlin reduced to an amount ranging from 0·4 grain to at the most 9 grains per 100 cubic feet of gas before the latter enters the purifiers; and in them it is always reduced to less than 1 grain per 100 cubic feet. The surface action of the oxide retains it mechanically—chiefly as carbonate. With the exception of the carbonic oxide, the other gases and vapours enumerated are removed from the gas in the purifiers, but are only loosely held by the oxide of iron employed there; and they partially escape when the foul oxide is spread on the revivifying floor. The sulphuretted hydrogen is absorbed by oxide with avidity; and on exposure to air and moisture, the sulphide of iron is converted to oxide and free sulphur. The absorbed hydrocyanic acid is first converted to a stable compound during revivification; and therefore an escape of the acid during the process does not appear to be precluded. Carbon disulphide and other sulphur compounds are taken up by the sulphur in the oxide and again escape, as does also the mechanically retained ammonia. The heating up of the mass during revivification favours the evolution of the gases in question.

Carbonic oxide is neither chemically held nor mechanically absorbed by oxide of iron, and therefore is only in evidence during the emptying of a purifier, in consequence of coal gas being retained in the vessel and the interstices of the mass. Therefore carbonic oxide is not found in recognizable amount in the air above the revivifying floor; and only samples of air taken in a vessel in course of emptying were examined for it. Ammonia was similarly estimated; but the air above the revivifying floor was examined for it also, as well as for hydrocyanic acid and sulphur compounds which were not tested for elsewhere. The samples were throughout taken at the level of the heads of the men working in the respective places; and the ordinary routine of work was continued during sampling. The tests were all made at the No. 3, or Müllerstrasse, works of the Berlin Municipality.

Hydrocyanic acid in air was found to be very difficult of accurate estimation. The blue colouration of paper dipped in tincture of guaiacum and solution of copper sulphate was found not to be a reliable proof of its presence. The method of absorbing the hydrocyanic acid from coal gas, by means of an alkaline solution containing in suspension ferrous oxide, was inapplicable to air, as the oxygen of the latter rapidly converted the oxide to the ferric state, and hydrocyanic acid was then no longer absorbed. It was also impossible to absorb the acid in a solution of potash, as in dilute aqueous solution the potassium cyanide formed would be decomposed by the air passing through the liquid. It was finally found that satisfactory results could be secured by passing the contaminated air through water containing in suspension some finely-divided mercuric oxide. Two absorption flasks containing respectively about 10 and 5 grammes of the mercuric oxide, suspended in 30 to 40 c.c. of water, were used for the absorptions. The contents were at the conclusion washed into a measuring flask, made up to the mark thereon, agitated, and filtered. A known portion of the filtrate was mixed with ammonia and zinc dust, made up to the mark on a measuring flask, and filtered. A known fraction of the filtrate was then titrated with solution of silver, according to Volhard's method as applied to the estimation of cyanogen in spent oxide and coal gas. Errors due to possible impurities in the reagents used were compensated for by an allowance ascertained from blank tests. This course was absolutely necessary, as the actual amount of hydrocyanic acid to be determined was very small. From 18 to 21 cubic feet of air were passed at the rate of 1¾ cubic feet per hour through the absorption vessels. Once-fouled oxide imparted to the air above the revivifying floor 0·000066 per cent. by volume of hydrocyanic acid. Another determination showed 0·00014 per cent. Oxide fouled 13 or 14 times, gave consistently 0·00012 per cent. The older material appeared to give out more hydrocyanic acid; but a test made on the air above oxide which had been exposed for some time on the revivifying floor, showed only 0·00002 per cent. of the acid. Therefore the amount of hydrocyanic acid in the air appeared to diminish as revivification advanced, until it could scarcely be detected at all. Not determination of the amount of hydrocyanic acid in air which has a definite harmful action appears to have been made. In Weyl's treatise on "Hygiene," it is said that poisoning by hydrocyanic acid or potassium cyanide rarely occurs in their industrial applications. It may safely be assumed that the amount of hydrocyanic acid in the air of factories where cyanogen preparations are produced is greater than that found above the revivifying floors of gas-works. There thus appears to be no foundation for the supposition that injury to health results from the hydrocyanic acid found in the air there.

Ammonia in the air was estimated by drawing 14 to 21 cubic feet of the air through excess of standardized sulphuric acid of one-twentieth the normal strength, and titrating the residual free acid against a solution of potash of similar strength. Freshly exposed spent oxide gave 0·00004 per cent. of ammonia in the air. After it had been exposed for some time, the volume fell to 0·00002 per cent. During the emptying of a purifier, the air breathed by the men contained on the average 0·00041 per cent. of ammonia. Weyl says Lehmann found that irritation was produced by 0·05 per cent. of ammonia in air, and that with 0·06 per cent. animals died in 1½ hours. Men were able to accustom themselves to breathe air containing 0·03 to 0·05 per cent. of ammonia. The amount found in the worst case on the gas-works was only about a hundredth part of this; and therefore no harm need be anticipated from it. In gas-works where the ammonia was less completely extracted from the gas before it entered the purifiers, the contamination of the air would probably be much greater.

Sulphuretted hydrogen was found in the merest traces when the air was passed over moistened lead papers. The total sulphur in the air was determined by passing it over heated platinized asbestos, and then through a solution of potassium carbonate containing a little bromine, and subsequently determining the sulphuric acid in the solution in the usual manner. It was anticipated that the freshly exposed heated oxide would evolve the greatest amount of gaseous sulphur compounds; and the tests were therefore made with such oxide. The nature of some of the sulphur compounds is not definitely known. But carbon disulphide is the chief; and if the whole of the sulphur present be assumed to be in that form, the air according to these researches would contain 0·00003 per cent. by volume of carbon disulphide, or 0·0085 grain per 100 cubic feet. According to Weyl 22 to 35 grains per 100 cubic feet of air is not really dangerous; and in the case under investigation, the amount found was only $\frac{1}{3000}$ to $\frac{1}{4000}$ of this quantity.

Carbonic oxide was, for reasons already stated, only tested for in the air of purifiers in course of being emptied. Samples of the air were taken by displacement of water as each tier of the purifier was emptied. The samples were then passed through a strong solution of caustic potash and a glowing platinum capillary tube. The carbonic acid produced thereby was determined by titration of baryta water. The accuracy of the method was proved by tests on known mixtures of coal gas and air. The percentages by volume of carbonic oxide found in the air were 0·006, 0·027, 0·038, 0·038, 0·032. Herr Hempel states that no indication of poisoning is observed with 0·043 per cent. The blood of a mouse which has breathed air containing 0·03 per cent., shows the carbonic oxide reaction when examined spectroscopically. But except there be an unusually strong escape of gas, the air in a purifier will not be dangerously charged with carbonic oxide. Continuous breathing of air containing a trifling amount of carbonic oxide is not attended with risk, as it is not a cumulative poison. The action of a small dose is not intensified by long application. The combination of carbonic oxide with the hæmoglobin of the blood is a loose one; and it is destroyed by a strong supply of air.

From the researches described above, Herr Drehschmidt has drawn the conclusion that work in purifying and revivifying houses is without special danger.

THE COAL ELEVATING AND CONVEYING MACHINERY AT THE ELLAND GAS-WORKS.

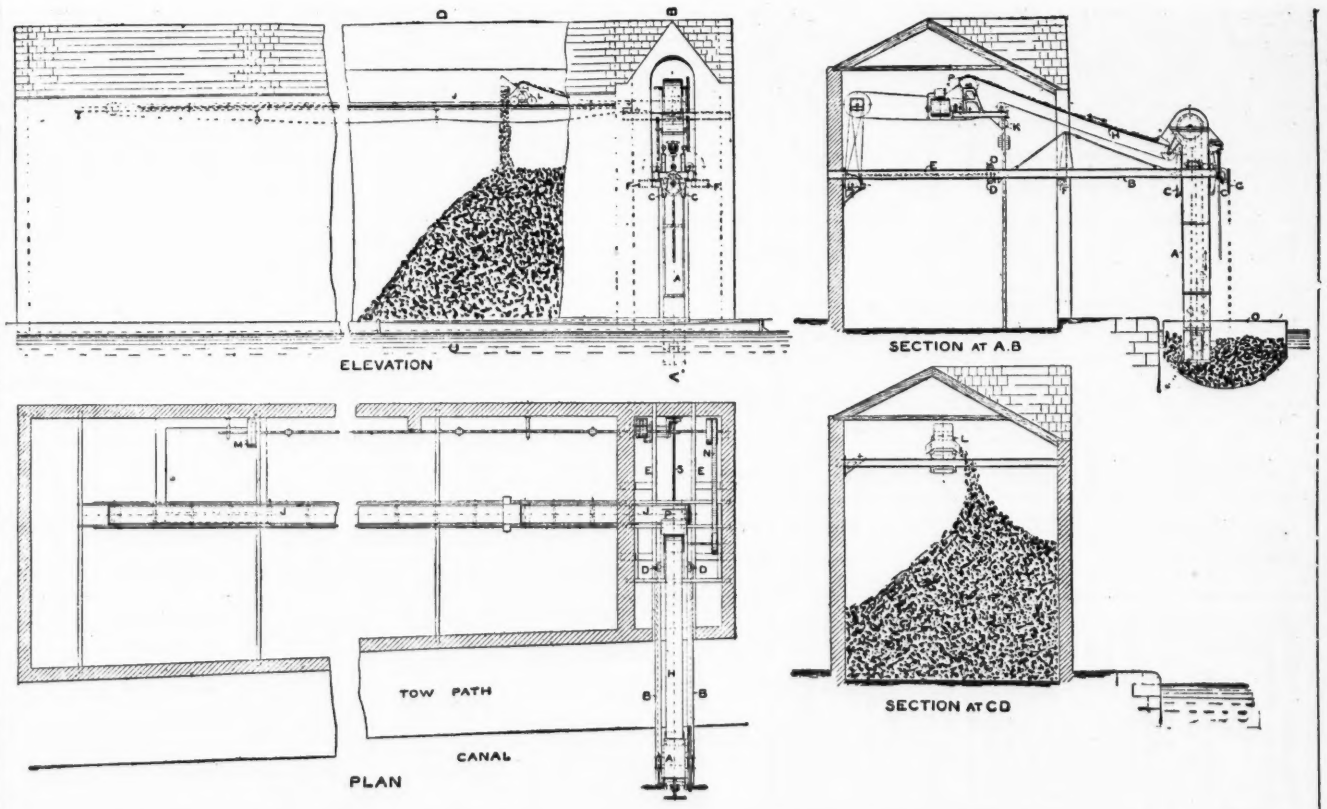
In the course of the description of the Elland Gas-Works given by Mr. Robert Porter, the Engineer and Manager, at the meeting of the Manchester District Institution of Gas Engineers last Saturday, as reported in another column, he referred to the installation of coal elevating and conveying machinery with which the works have been provided. The plant, which was erected by Messrs. J. Buchanan and Sons, of Liverpool, has been described and illustrated in the "Engineer," from which the following particulars are reproduced:—

The coal supply for the works is brought by canal in barges alongside the Company's coal-store, and the machinery was specially designed and constructed for dealing with large coal as it comes direct from the colliery without previous treatment in a coal breaker; thus saving the extra handling and machinery required thereby. The coal in this instance is taken direct from the barges, and deposited in any part of the store in a continuous stream at the rate of 20 tons per hour when fully fed; the only hand labour required being the feeding of the coal into the elevator hopper.

The elevating machinery and the band conveying the coal across the tow path had to be so arranged that it could rise and fall automatically with the barge, and be moved out or in across the path by power mechanism; it being necessary to leave the path clear and unobstructed after the barge was emptied. These conditions involved the application of special and ingenious arrangements of gear for hoisting and travelling motions. The apparatus, as shown by the accompanying illustration, consists of a vertical casing or trunk A, constructed of wrought-iron plates and angles, supported vertically by wire ropes, and attached to a pair of travelling beams B, as shown. The top of the elevator casing is stiffened by plates and angles for carrying the driving gear; the bottom portion being provided with a suitable hopper and tightening gear. The elevator casing is kept in a vertical position by means of strong cast-iron guides C, having anti-friction rollers top and bottom, running on machined guide-strips riveted to the casing.

The coal is raised by means of strong riveted steel buckets, 12 inches long, 10 inches wide, and 8 inches deep, attached by the ends to a double strand of chain of special make, and working over large sprocket-wheels at the top and bottom; dump-wheels being applied at the top to facilitate a clear discharge. The elevator casing is raised out of, or lowered into, the barge by means of special power hoisting arrangements, consisting of friction cones and mitre wheels, driving a vertical square shaft, which in turn transmits its motion through worm-gearing into a pair of worm-wheels which are keyed on the ends of the barrel-shafts on either side of the elevator, and carried by strong filbows bolted to the ends of the travelling beams. The elevator casing is suspended on each side by steel wire rope, one end of which is fastened to the under-side of the beam, and the other passed round the sheave, and led on to the barrel. From the shackle to the sheave the casing is hung by chains attached to the bottom portion as shown.

The carriage B supporting the elevator is constructed of steel joists plated on top and strongly trussed, and provided at the back end with top and bottom anti-friction rollers D, which run on corresponding steel beams E, built into the walls of the building, and additionally supported at intervals by strong cast-iron side brackets. At the front wall the travelling beams run on live rollers, carried in cast-iron boxes F built in the wall; the boxes serving as oil reservoirs for the rollers, and ensuring their efficient lubrication. The travelling beams are propelled in and out by means of a steel screw S of large diameter, working in a phosphor-bronze nut fitted into a cast-iron stay connecting the ends of the two beams together; the power being derived from open and crossed belts from the main driving-shaft situated at the back end of the elevator-house. The hoisting gear is driven from the top shaft of the elevator by a short hair belt. A chain-pulley G is also provided, geared to the square shaft by a pair of mitre wheels, by means of which the elevator can be raised or lowered by manual power, in the event of the engine being stopped from any cause.



The elevator casing is formed at the top with a suitable discharging head, from which the coal is delivered over an inclined shoot with side guide-plates on to an endless inclined travelling band 24 inches wide, constructed of woven material specially prepared for dealing with coal or other hard substance. The cross band conveys the coal across the tow path, and delivers it by means of suitable shoots on to another endless travelling band J, 24 inches wide, situated inside the building, and running the whole length of the store. The cross band is provided with a jockey pulley arrangement K, having weights attached, guided in channel-iron uprights, which enables the band to automatically adjust itself to any position of the elevator, and maintains also a constant tension on the band. The long band J inside the house is supported at intervals on suitable rollers carried on channel-irons, fixed to cross beams built into the walls of the store. This band is fitted with a special throwing-off carriage L, so arranged that it can be moved along the store to any point, and the coal discharged on either side as desired. To take up any slacking that may occur in this band, a simple

stretching-gear arrangement is provided. The power for driving the apparatus is obtained from the coal-breaking engine, the belt from which drives up on to a pulley M (shown on the plan), keyed on to the end of a line of shafting which extends to the elevator-house. The whole apparatus is driven by one main belt N, from the main shafting and spur and bevel gearing shown. Suitable arrangements are provided for conveniently stopping and starting the whole or any portion of the plant.

The working of the apparatus may be described as follows: The coal barge O being moored alongside the elevator-house, the elevator casing A is raised off the ground, run out, by means of the screw, over the canal bank, and elevated as required to pass over the barge, on to which it is lowered where wanted. The elevator is then started to work; the two bands being set in motion at the same time. The coal is shovelled into the bottom hopper of the elevator by men in the boat; and being lifted by the buckets, it is delivered at the top on to the cross band H, conveyed across the tow path, and dropped on to the end of the long band J, which is provided with a suitable hopper P and side plates to lay the coal properly on to the band. The coal is then carried at right angles to its previous direction by the long band J, through the store, and by means of the throwing-off carriage L is discharged over either side into any part of the house. As the barge rises on being emptied, it lifts the elevator freely with it; the slack of the suspending wire ropes being taken up as required. The whole of the operations are worked by power; the raising, lowering, and running-out motions being easily effected by unskilled attendants.

DR. BUNTE ON BYE-PRODUCTS AND AUXILIARY MATERIALS.

One of the most interesting communications to last year's meeting of the German Association of Gas and Water Engineers, was some notes by Dr. H. Bunte on "Bye-Products and Auxiliary Materials of the Gas Industry." With characteristic modesty, the learned Doctor has given priority of publication in the official organ of the Association—the "Journal für Gasbeleuchtung," of which he is Editor—to all the other papers read at the same meeting; and his own communication has only just appeared in print. Nevertheless, his remarks are as apposite to-day as when they were made, rather more than twelve months ago; and we have therefore abbreviated them but slightly in the following translation.

Recent years have witnessed a change in the relative positions of the staple and bye-products of the gas industry. The importance of the bye-products has increased with the cheapening of gas; and at the same time carburetting materials, the rare earths, and other valuable auxiliaries to coal—the primary raw material of the industry—have come into use. With regard to the bye-products, cyanogen has lately been added to coke, tar, and ammonia.

Coke is recognized as a household fuel; and its consumption as such is encouraged by those gas-works which break it small. But it deserves also to be more largely used as an industrial fuel. In many towns, the much-vexed question of smoke prevention would find an easy solution in a wider use of coke. Both coke and breeze have been adopted for years as boiler fuels on gas and water works, but very rarely indeed anywhere else. Yet systematic endeavour should open up a large market for coke in this direction. The grate and hearth designed for the consumption of coal require alteration to fit them for burning coke. If such alteration is not made, attempts to use coke as fuel for boilers will generally end in failure. The heat of combustion, or the total calorific value of the coke, is the most important factor in computing its value as a fuel. Strangely enough, there are few records of the composition and calorific value of coke; and therefore the examination of average samples of coke made at the gas-works at Berlin, Breslau, Munich, and Hamburg was undertaken. The results are given in the annexed table, from which it will be seen that the percentage of ash ranges from 3·7 to 11·6. The calorific value of the coke varies with its content of ash. Disregarding water and ash, the calorific value of the combustible material averages 7783 calories per kilogramme (14,010 British thermal units per pound); and the extreme values show a difference of only 400 calories, or about 5·0 per cent. The calorific value of the different air-dried cokes varies from 6695 to 7268 calories per kilogramme (12,051 to 13,082 British thermal units per pound), or by about 8·5 per cent. The average value is 6959 calories per kilogramme (12,526 British thermal units per pound). Though these figures are rather lower than the calorific value of very good coal, yet it must be remembered that the uniform and smokeless combustion which can be achieved in practice with coke renders possible a greater utilization of its heating power than can be attained with most other furnace fuels.

The value of tar and ammonia has fallen greatly of late years, owing to the competition of the coke distilleries. The price of sulphate of ammonia was first depressed by the output of nitrate of soda; but more recently it has dropped still further from over-production, brought about by the adoption of sulphate manufacture at the Scotch shale works, as well as at coke-ovens and gas-works. A return to the price which sulphate obtained

Chemical Composition and Calorific Value of Some Varieties of Gas Coke.

Description of Coke (Source of Coals).	Composition of the Air-Dried Coke.							Percentage of Combustible Material.	Fixed Carbon.	Volatile Constituents.	Calorific Value.				Calorific Value of the Combustible Portion of the Coke.			
	Carbon.	Hydrogen.	Oxygen.	Nitrogen.	Sulphur.	Water.	Ash.				Calculated by Dulong's Method		Found by the Calorimeter.		Calculated by Dulong's Method.		Found by the Calorimeter.	
											Calories per Kilo.	B.T.U. per Pound.	Calories per Kilo.	B.T.U. per Pound	Calories per Kilo.	B.T.U. per Pound.	Calories per Kilo.	B.T.U. per Pound.
From the District of the Ruhr—																		
(1) Consolidation Pit	85·18	0·70	2·65	1·39	0·87	1·79	7·42	90·79	90·58	0·21	6,967	12,541	7,057	12,703	7,686	13,835	7,785	14,013
(2) Rhine-Elbe and Alma Pits	85·30	0·81	3·30	1·50	0·88	1·71	6·50	91·79	89·75	2·04	6,982	12,568	7,071	12,730	7,617	13,711	7,716	13,889
(3) Ewald Pit	80·68	0·90	2·31	1·43	1·17	2·33	11·18	86·49	83·98	2·51	6,675	12,015	6,716	12,089	7,734	13,921	7,781	14,006
(4) Bonifacius Pit	82·03	1·07	2·12	1·49	1·02	1·53	10·74	87·73	84·56	3·17	6,841	12,314	6,851	12,332	7,808	14,054	7,819	14,074
From the District of the Saar—																		
(1) Camphausen Pits	82·91	1·00	1·60	1·00	1·43	1·79	10·27	87·94	85·14	2·80	6,935	12,483	6,936	12,485	7,899	14,218	7,900	14,220
(2) Heinitz Pits	88·08	0·78	1·82	1·03	0·81	0·96	6·52	92·52	91·78	0·74	7,271	13,088	7,268	13,082	7,865	14,157	7,862	14,152
From Upper Silesian Coals—																		
(1) Deutschland Pits	88·24	0·75	1·92	1·21	0·96	3·20	3·72	93·08	90·62	2·46	7,257	13 063	7,265	13,077	7,817	14,071	7,826	14,087
(2) Konigin Louise Pits	86·35	0·54	0·83	1·18	0·96	3·73	6·41	89·86	87·93	1·93	7,080	12,744	7,111	12,800	7,903	14,225	7,938	14,288
From Lower Silesian Coals—																		
Vereinigten Glückhilf Pit	82·38	0·92	1·35	0·99	1·24	1·52	11·60	86·88	85·54	1·34	6,877	12,379	6,960	12,528	7,926	14,267	8,022	14,440
From Bohemian Coals—																		
(1) Sukov Pit	84·60	0·53	1·93	1·03	0·90	1·39	9·62	88·99	87·23	1·76	6,913	12,443	6,991	12,584	7,778	14,000	7,865	14,157
(2) Paukraz Pit	80·73	0·83	2·95	0 89	0·81	2·31	11·48	86·21	83·74	2·47	6,647	11,965	6,702	12,064	7,726	13 907	7,790	14,022
From English Coal—																		
Pit not known	80·71	0·76	2·90	1·51	1·10	1·69	11·33	86·98	84·07	2·91	6,616	11,909	6,695	12,051	7,618	13.712	7,708	13,874

at the beginning of the eighties is quite out of the question; and only a very moderate revenue can now be expected from gas liquor. Sal-ammoniac, ammonium carbonate, or liquid ammonia would give rather better returns than sulphate; but their production is not so simple a matter, and will be taken up at few gas-works. Under these circumstances, many works of moderate size have given up making finished ammonia products, and merely produce a concentrated gas liquor containing about 15 per cent. of ammonia. Sulphate of ammonia, on the other hand, contains about 25 per cent. of ammonia. Recently gas liquor has been largely used for producing pure liquefied ammonia for use in refrigerating machines. This ammonia is exported from Germany in large quantities, stored in wrought-iron bottles, at about 200 atmospheres pressure. There appears room for considerable extension of this use of ammonia. About 90 per cent. of the ammonia is, however, still used in the form of sulphate as a manure. Quite lately a new competitor has appeared, which may further damage the sale of sulphate for this purpose. Investigations have shown that the presence of certain bacteria in the soil enables plants to assimilate the nitrogen of the atmosphere, and to build up therefrom albuminoid substances. Thence it was not a long step to pass to the artificial infection of the soil with such bacteria. The Höchst dye-works, whence tuberculin and diphtheria serum came into commerce, have produced a serum, called "Nitragin," which imparts this capacity of assimilating the nitrogen of the atmosphere to soil or roots inoculated with it. The results of the application of this serum have not so far been sufficiently definite to show whether it will actually become an active competitor of nitrate of soda and sulphate of ammonia; but experiments now being made with it ought to be closely watched by those interested in the latter commodity.

Cyanogen is the ingredient of spent oxide which has of late years been chiefly responsible for the market value of that material.* The demand for cyanogen was brought about by the use of potassium cyanide for extracting gold according to the MacArthur process from the South African ores. The high price of the cyanide called forth a host of inventions for its production; so that the supply is now exceeding the demand, and the value of spent oxide rich in cyanogen has fallen considerably. On the whole, the outlook is not encouraging so far as the bye-products of the gas industry are concerned; but it is best to realize now the dark side of the prospect, rather than be taken unawares later on.

The auxiliary materials are a recent innovation, as till lately only coal and purifying materials were usually required in gas manufacture. Now benzol and petroleum spirit are used for enriching coal gas. The production of benzol at the coke-ovens has made its general use in gas-works possible, though, indeed, a rise in price has lately been witnessed, and many works have temporarily discarded it. The benzol market has always been a speculative one; and an attempt was made to regulate prices by the formation of a syndicate of buyers. Owing, however, to want of co-operation, the scheme was not successful. Then the coke-ovens failed to turn out the quantity expected of them. The recovery of benzol from coke-oven gases was started at Dortmund by the late Herr Brunck, and was introduced by the firm of C. Otto and Co., of Dahlhausen, at several of their coke distilleries. But the firm have a duality of interests—on the one hand, new installations injure the value of their own produce; while, on the other hand, the costly installations pay a licensing fee, and hence production is restricted. These obstacles will probably soon be overcome; and then new benzol-recovery works will be erected, and will fully cope with the demand.

Petroleum spirit has been much used for carburetting purposes in England and America, in place of benzol. In Germany, the duty on petroleum practically precludes its importation; and light oils of a suitable description are not made in the country. The discovery of fresh supplies of petroleum in Germany, or the abolition of the import tariff, would alter the conditions with regard to the use of petroleum spirit.

The rare earths used for the manufacture of mantles for the incandescent light, are the most important recent auxiliaries of the industry. Monazite sand from South Carolina is now extensively used for the production of thorium oxide, of which it contains only 7 per cent. The following table shows that all the mantles included in it contain about 97 per cent. of that oxide:—

Composition of Some Mantles.

Name of Mantle.	Welsbach.	Bischoff (Fluid).	Meteor.	Siemens.	Weber.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Thorium oxide . . .	98·8	98·9	96·6	96·0	97·8
Cerium oxide . . .	1·0	1·0	1·0	3·6	1·8
Lime, magnesia, &c. .	0·2	—	0·5	0·4	0·2
Yttrium oxide . . .	—	—	1·2	—	—

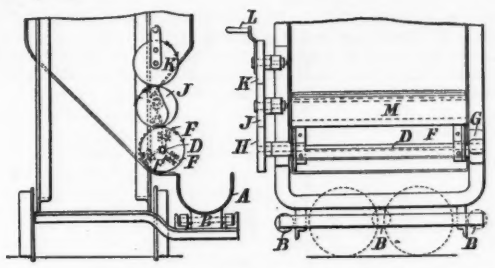
Strangely enough, a mantle made of very carefully purified thorium oxide alone, gives a light of only 2¼-candle power. Mantles of pure yttrium oxide only, and of cerium oxide only, are equally inefficient. But the illuminating power of the thorium oxide mantle can be at once raised by impregnating it with a solution of a cerium salt. At the time, a satisfactory explanation of this strange phenomenon appears wanting. But we may hope that this portal of science too will soon be opened to us; and we may then expect a further advance in incandescent lighting.

* Dr. Bunte is here speaking of oxide fouled under the customary Continental conditions—viz., anterior to other purifying materials, if such are used at all in the series of purifiers.—Ed. J.G.L.

REGISTER OF PATENTS.

Filling Retort Scoops.—Lyon, C. W., of Dewsbury, and Deighton, G., of Ripon. No. 17,938; Aug. 13, 1896.

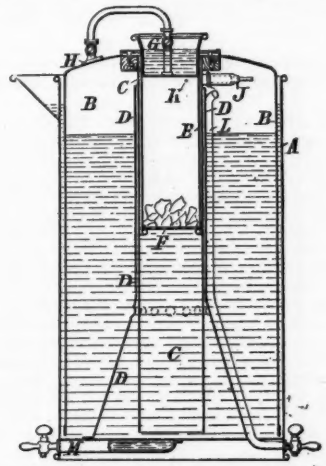
This is an invention of "a hopper waggon constructed for supplying or filling scoops with coal by the use of the blade arrangement" shown in the engraving.



A is the scoop, resting on the runners B, fixed on angle irons. On the revolving shaft D are keyed two castings, to which are bolted (say) three blades F. The shaft D is carried by two bearings fastened to the framework of the waggon. The end of the shaft is fitted with a spur-wheel H, which runs in gear with an idle wheel J, which again runs in gear with a spur-wheel K. To this spur-wheel is bolted the handle L, by which the machine is worked. By turning the handle in the direction of the arrow, motion will be communicated to the shaft D, which carries the blades F; and as the coal falls on the blades it is carried forward, and falls by gravitation into the scoop. Above the blade arrangement F is fixed a door M, working on a pin, so as to admit of large coal being carried over by the blades. It is not necessary for the hopper carrying the scoop to be the length of the scoop, as the latter rests on the runners B. When the portion of the scoop opposite the blade arrangement is filled, the scoop may be pushed forward on the runners, and another portion of the scoop filled.

Generating and Storing Acetylene.—Gaskell, G. W., and Gibbs, R. R., of Liverpool. No. 20,074; Sept. 10, 1896.

In this arrangement, the acetylene generator is separated from the gas chamber by a water seal, and is so designed that it can be emptied and filled without escape of acetylene into the air, and while the holder is in use; also an arrangement whereby the lime can be withdrawn at intervals without loss of gas. In one form of the apparatus—that shown in the engraving—A is a tank, having a spout at top. B is a gasholder sliding in this tank, being guided therein by the vertical tube C, passing through another vertical tube D. The latter has a series of holes pierced



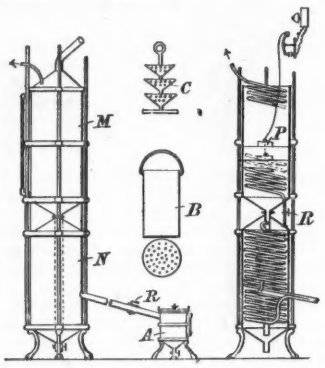
in it; while the bottom of the tube C is open. E is a third tube slightly splayed out at the top; while on the lower end (standing on a wire rim) is a perforated plate F, on which the carbide rests. G is a hollow plug, with a pipe passing up through it, and supplied with a pet cock. It can either end at this point in a burner, or be curled round and introduced into the chamber B at H. J is a pipe attached to the side of the tube C, having an india-rubber nozzle that will open with little pressure and allow gas to escape from the tube E through the tube C, but closes instantly against any return of the gas. A very fine hole K is used, to allow a small leak from the tube E. L is a pipe leading from near the top of the chamber B to a tap, so as to draw off gas; and M is another pipe leading from the centre of the enlarged part of the tube D, and having a cock at the end. When lime collects at the bottom of the tubes C and D this cock is opened, and the egress of water drives out the lime with it.

When in operation, the plug G and tube E (which are only connected by a flexible pipe with the cock H) are lifted out of the tube C, a supply of carbide is inserted, and they are then replaced. The water rising in

the pipe C so as to be on a level with the rest of the water attacks the carbide, and the acetylene given off passes out through the valve J into B; the slight pressure required to open the valve serving to keep the height of water in the tube C very little below that in the chamber B. The increase of gas in B causes the holder and tube C, together with the carbide-tube E, to rise; and the water in the two chambers being nearly on a level, the carbide is lifted above the level of the water. If, however, gas be drawn off through the pipe L, the chamber B, and with it the carbide-tube E, will fall again until more gas from the tube E arrests the fall.

Generating and Storing Acetylene.—Thompson, W. P., a communication from V. I. Comucci, of San Giovanni di Val d'Arno, Italy. No. 20,694; Sept. 18, 1896.

The generator is composed of a container A preferably of iron, and a bucket B, in the basket C which carries the carbide. Two tubes controlled by a single cock R place the upper and lower parts of the gasholder in communication. A float P is connected to a contact-lever articulated at a point which serves to indicate, by an electric bell, when the level of the water sinks to its lowest point. The bottom of the upper container M terminates in a funnel, a long tube from which passes into the lower container N almost to the bottom. As already stated, the generator communicates with the gasholder by two small tubes, which are in their turn connected to two worms.



In order to set the apparatus at work, there is first placed in the container A the bucket with its basket C, charged with a fixed quantity of carbide corresponding to the volume of gas required. There is then supplied to the container M a quantity of water sufficient to completely fill the lower container N; care being taken to leave the cock of the pipe between the containers open, in order that the air may be completely displaced from the lower container, after which the cock is closed and still more water is added so as to have an excess in N. Then a quantity of water corresponding to the capacity of the generator A is poured in. In order to develop the gas, it is only requisite to open the cock R, when the water penetrates into the generator by the two tubes, descends into the annular space between the bucket and the container, and passing through the holes in the bottom of the bucket it immediately reacts upon the flat or lowest stage of the basket, causing evolution of gas. This, in consequence of the resulting pressure, drives out, on the one hand, the water from the coil and passes into the upper part of the receiver M, and prevents, on the other hand, in consequence of the pressure, any further quantity of water from descending by the lower tube and coming into contact with the carbide.

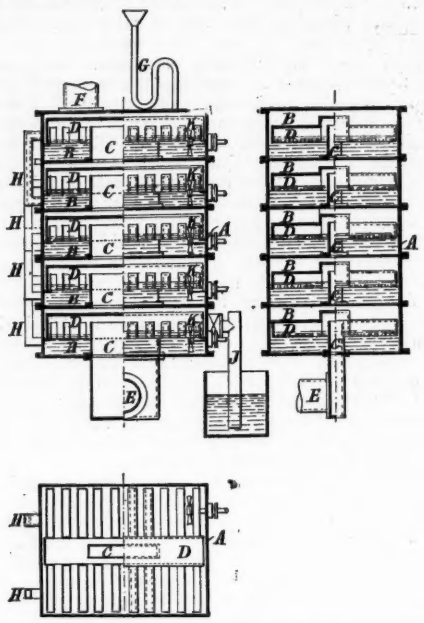
Manufacturing and Recovering Cyanides.—Lewis, G. P., of Catford, S.E., and Cripps, R. A., of Haywards Heath. No. 20,883; Sept. 21, 1896.

This invention relates to means for recovering cyanides from coal gas in the form of sulphocyanides, ferrocyanides, or prussian blue, as may be required, by apparatus shown in the accompanying engraving.

A is a rectangular vessel, divided horizontally into four or more watertight compartments B. Standing up from the floor of each compartment, is a broad tubular projection C, which forms a passage for the gas to be treated. Above each passage is a cover D, which extends over the greater part of the compartment in which it is set; being supported on brackets carried by the sides of the compartment. The cover is intended to receive, and spread through the washing liquor, the gas under treatment. For this purpose, it is made with a main central channel, from which project laterally, on both sides, passages closed at their ends, and taking the form of inverted troughs, the lower edges of which are serrated, to facilitate the escape of the gas into the washing liquor in minute streams, so that the gas may arise through the liquor in the form of globules. The gas to be treated enters by the pipe E; then up through the rectangular pipe C into the inverted trough D; and from thence is caused to bubble through the washing liquor, by passing through the serrations, and so on, from chamber to chamber in succession, until it finally leaves the apparatus by the pipe F. The liquor for use in the washer (prepared as hereafter described) is run in through the syphon-pipe G, and overflows from chamber to chamber by the pipes H; and, when fully saturated with cyanogen, leaves the apparatus by the pipe J. Each of the chambers also contains a revolving screw propeller K, actuated by suitable gearing, and immersed in the washing liquid for the purpose of keeping it in active circulation.

Ferrocyanides or sulphocyanides, in several forms, can be produced at will, by simply changing the composition of the washing liquors. Thus (say the patentees) we can obtain a sulphocyanide of an alkali, or an alkaline earth, by adding to such alkali, or alkaline earth (preferably in the form of hydrate), a source of the liquid condensed from the "waste gases" evolved from an ammonia plant, for the manufacture of sulphate or muriate of ammonia, commonly known as "devil" liquor, and which contains much sulphuretted hydrogen in solution, thereby converting the alkali, or alkaline earth, into a sulphide. This "devil" liquor sometimes contains ammonia; but, for the above purpose, it is preferable that it should be free from it. Alternatively, the same result may also be achieved by passing sulphuretted hydrogen, or gases containing it, through the alkali in solution, or through water containing the alkaline earth in suspension. Flowers of sulphur are then added to the mixture made by either of the methods already described.

The liquor, after being exposed to the air for a day or so, should be in a suitable condition for use as a washing medium for recovering the cyanogen in the gas in the form of a solution of a sulphocyanide of the alkali or alkaline earth employed.



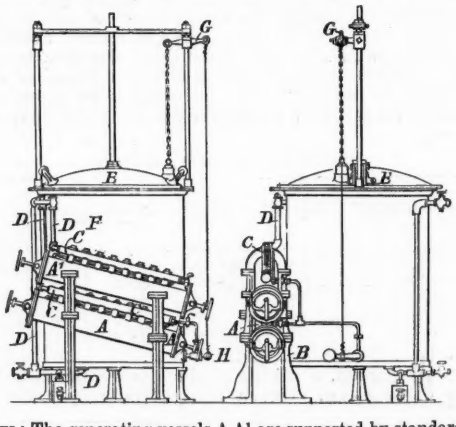
Sulphocyanides may be produced by the use of a washing agent, containing an alkali in solution, or alkaline earth suspended in water, without such preliminary treatment; but the effect of the beforementioned process is to render the mixture immediately effective for absorbing cyanogen, and more certain in its action. A small percentage of oxygen in the gas to be treated is necessary for the proper reactions to take place in recovering sulphocyanides by the method described.

For the production of ferrocyanides, the patentees employ, as the washing liquor, a solution of an alkali—such as soda, potash, or ammonia—containing sulphide of iron in suspension. Thus, supposing they employ potash as the alkali, they obtain a solution of ferrocyanide of potassium. The quantity of iron in suspension should be considerably in excess of the theoretical quantity to form the salt.

The sulphide of iron required is produced as follows: Dissolve scrap iron in sulphuric or hydrochloric acid, and treat the resulting solution with "devil" liquor; or it may be run into a washer, and "waste gases" before mentioned passed through it, so as to produce insoluble sulphide of iron, which is precipitated by the action of the sulphuretted hydrogen contained therein. The resulting solutions of sulphocyanides or ferrocyanides are evaporated, and crystallized in any of the well-known methods. Prussian blue is produced by employing crude ammoniacal liquor containing sulphide of iron in suspension, as the washing agent, thereby obtaining a solution containing ammonium ferrocyanide, which may be run through the ordinary ammonia stills, and treated with lime in the usual way, producing calcium ferrocyanide in the effluent liquor. The effluent is run into a tank, and treated for the recovery of prussian blue, by a similar method to that described in patent No. 5184 of 1896.

Generating and Storing Acetylene.—Kay, A., of Doune, N.P. No. 21,351; Sept. 26, 1896.

In carrying into practice this invention, one or more generating vessels are used; but it is preferred to employ at least two—one fitted over the other—arranged in connection with the storage vessel and water supply



as follows: The generating vessels A A^1 are supported by standards in an inclined position, and are connected to a condensing vessel C above them fitted at a similar angle. The gas generated flows up into the condenser,

and any water carried up along with it gravitates to the lower end, whence it flows down into the generator below. From the condensers, the gas is led by pipes D first upwards and then downwards, to be admitted to the storage vessel or holder E. This is preferably an ordinary gasholder within a water-tank F. The holder has a vertical rod fitted to its top part, working through a guiding crossbar, and preferably has also guide-pulleys running on the standards.

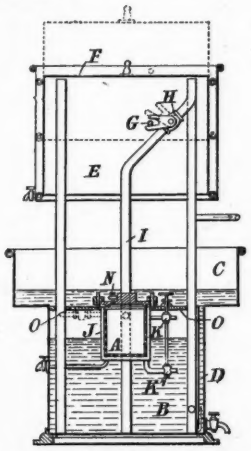
A small beam lever G is fulcrumed on one of the standards near its upper end; and a weight is suspended by a chain from its inner end. The other end of the lever G is connected to a weighted lever H, which opens or closes the valve which allows water to flow from the tank F to each generator by pipes fitted with stopcocks. The water may be led to the lower generator A direct; and the pipe leading to the upper generator A^1 be led up to a point higher than it, and then bent downwards to enter the generator at its lower end—both pipes being fitted with stopcocks. By this arrangement, water as supplied flows first into the lower generator; and when gas ceases to be generated there, into the one above.

It is preferred, however (as shown), to lead the water-supply pipe along the upper side of each generator, whence the water is conveyed to the interior by small nozzles. The water is thus very gradually admitted to the carbide, and the generation of gas is effected slowly and without producing any sudden pressure. When the carbide of one generator is exhausted, the water supply can be cut off from it and opened to the other one, when the first generator can be cleaned out and recharged without cutting off the gas supply or stopping the generation. When consumption ceases, or is not equal to the generation, the gasholder rises; and this releases the lever G, and allows the weighted lever H to cut off the water supply by closing the water-valve. The gas generated is led away from the holder by the pipes I for consumption where desired.

Generator for Acetylene Gas.—Barker, A. H., of Eccleston Square, S.W. No. 21,698; Sept. 30, 1896.

This invention has for its object to obviate the admixture of acetylene with air admitted to the interior of the generator during the process of charging, on the introduction of carbide into contact with the water.

The generator (preferably cylindrical in form) is provided at the upper part with a carbide holder A. Communication is arranged from the generator B with a tank or cistern O, disposed at a higher level, from which water passes by way of the tube D to fill the generator. The gasholder or receiver E comprises a bell F mounted in a container to which water is supplied; and the gas on generation passes up into the bell by way of the pipe I, and through the perforations in the pipe, and effects the raising of the bell, and the depression of water therefrom. The upward movement of the bell is determined by a contact-piece G, which effects the closing of the inlet-valve H. The supply is taken from within the bell F by way of the downcast pipe P; and on the bell reaching its topmost limit, the passage of acetylene is stopped. If generation still proceeds, and pressure is accumulated in the generator B, this gradually effects the depression of the water contained in the generator from the normal level to such an extent as to lower the level of the water out of contact with the carbide. On the consumption of the gas accumulated in the holder, the bell falls and the communicating cock H from the generator is opened, and the gas under the accumulated pressure in the generator passes through to the holder; and the level of the water in the generator is consequently raised by the return of the water from the tank C, and the generation of gas resumed.



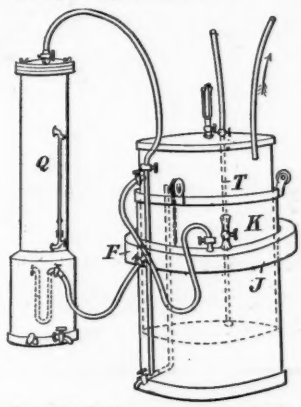
In order to obviate the possibility of admixture of air with the acetylene on the introduction of the carbide holder within the generator, there is mounted within the generator from the upper surface a receiver J, designed to receive the carbide holder. This receiver is of such form that it can be completely shut off from the water in the generator by means of valves K K^1, operated at will by a spindle passing through a stuffing-box. In order to avoid any mixing of the acetylene with air within the generator in charging, the generator is filled up to the level of its cover D, leaving only a slight layer of water within the receiver J—the valves K K^1 being closed. Upon the introduction of the carbide holder, which closely fits the receiver, a sufficient quantity of acetylene is generated (by the water attacking the carbide through perforations in the holder) to displace all the air in the spaces between the lumps of carbide through an aperture in the lid provided with a cock N. After shutting off this cock, opening the valves K K^1 puts the generator into action in the manner described; and by closing the valves, the carbide holder A may be removed and recharged at any time without interfering with the gas supply.

Regulating the Admixture of Acetylene Gas and Air.—Oving, H. E., of Rotterdam. No. 23,670; Oct. 24, 1896.

This invention is complementary to the one of the same patentee described last week—patent No. 23,669 of 1896 (see p. 437)—and refers specifically to the mixing drums there indicated by C. This is the device for regulating the mixture of acetylene or other gas and air. It consists of a chamber partially filled with liquid, and a horizontal shaft carrying two or more drums provided with blades in combination with the air and gas inlet pipes, and an outlet for the mixture of air and gas. The proportional mixture of the gas and air is accomplished by a combination of two or more drums, provided in their interior with helical blades; the whole being enclosed in a chamber filled with liquid to a given height. This creates a free space in each of the drums, one of which receives the gas under a constant pressure—whereby the drums are caused to rotate, and the level of water is lowered in the gas-drum and raised in the drum which is in communication with the air, and thus exactly determines in a continuous manner, by the differences in the level, the volume of each of the constituents which are mixed in the open space over the liquid in the tank.

Generating and Storing Acetylene.—Chesnay, E., and Pillion, L., of Dijon, and Bertolus, C., of St. Etienne, France. No. 21,758; Oct. 1, 1896. Date claimed under International Convention, April 1, 1896.

Apparatus constructed according to this invention comprises a vessel or trough J, in which is arranged a bell K dipping into water in the same manner as an ordinary gasholder. Around the vessel J is arranged an annular receptacle F, which serves to balance the weight of the bell to which it is connected by chains passing over pulleys. The receptacle F communicates with the lower part of the generator Q (which is of the kind described in patents Nos. 18,992 and 20,090 of 1896) by means of an india-rubber pipe, and also at its upper part with the upper portion of the holder by means of another rubber pipe, so that the same pressure will obtain in F as in the holder and generator. Another pipe serves to effect communication between the upper parts of the generator and holder, and serves to allow of the gas, when generated, passing into the holder for distribution according to requirements.

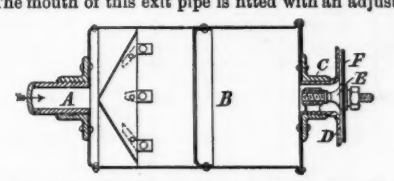


As the gas is produced in Q, it passes into the holder through the last-named pipe; and if the production is greater than that required by the delivery from the holder, the bell is raised by the accumulation of gas therein The result is the lowering of the annular receptacle F; and since there is an equal pressure in F and Q, the water-level in the generator will fall, and contact will no longer be maintained between the water and the calcium carbide. As a consequence, the production of gas will cease. But as gas is drawn off from the holder, the bell will descend in the water-vessel J, and the annular receptacle F will simultaneously rise; and, in consequence of the manner in which the producer, holder, and receptacle are connected together, contact will be remade between the water and the carbide, so as to cause fresh generation of gas.

The apparatus includes a safety device, which comprises a gas-exit pipe T arranged within, and made slightly shorter than, the bell K of the holder. It is provided with a cock, and the upper end communicates with the atmosphere. With this arrangement, when the production of gas is in excess of the requirements, any liability of the excess raising the bell to its full height, and thus becoming a source of danger, is avoided owing to the pipe T, the cock of which is always kept open, serving to regulate such excess by allowing the superfluous gas to escape. The pipe T dips into the water in J so long as there is no excess of gas in the bell; but when the bell, by reason of the pressure of the gas contained in the holder, rises unduly, communication is established between the interior of the bell and the outer air by means of the pipe T.

Silencing the Exhaust in Gas-Engines.—Smith, M. H, of Victoria Street, S.W. No. 25,642; Nov. 14, 1896.

In carrying out this invention, the exhaust-pipe A from the engine is connected to a chamber B, preferably circular, and of larger capacity than the cylinder. At some part of the chamber, as far removed as possible from the entrance, an exit-pipe C is placed, terminating in a flange D. The mouth of this exit pipe is fitted with an adjustable cone E



carrying a metal plate or diffusing diaphragm F, approximately of the same diameter as the flange, and provided with small holes near its circumference, so that it can be readily turned for adjustment by means of a pointed rod or spike. By properly adjusting the plate, the speed of the escaping gases, which have previously expanded in the chamber, can be controlled and their diffusion over a large area secured—thus considerably reducing the noise of the exhaust, without putting undue back-pressure on the engine.

Manufacture of Carburetted Water Gas.—Humphreys, A. C., and Glasgow, A. G., of Victoria Street, S.W., and New York. No. 11,130; May 4, 1897.

The patentees claim to have ascertained that, in the manufacture of carburetted water gas, the blast gases, as they leave the regenerative chambers used for carburetting and fixing the gas, have still sufficient sensible and potential heat to impart a high temperature to the air used in the blowing-up operation, and that this heat can be utilized to pronounced advantage by the methods described. An essential feature is the provision of two independent or supplemental regenerative chambers connected with the chambers used for carburetting and fixing the gas in such way that the blast gases, after leaving the fixing chambers, will traverse, and impart heat to, the independent chambers. The independent chambers, however, forming no part of the water-gas conduit, and being connected with the air-blast apparatus and the generator in such a way that the air used in blowing-up the generator fire will traverse, and be heated in, the independent regenerative chambers, preferably passing from the independent chambers through the fixing and carburetting chambers to the generator. This is rendered practicable by reason of the fact that the temperature of the air is so high that it will not tend to rob the fixing and carburetting chambers of an injurious amount of heat, as would be the case if passed directly to them without preheating.

Fig. 1.

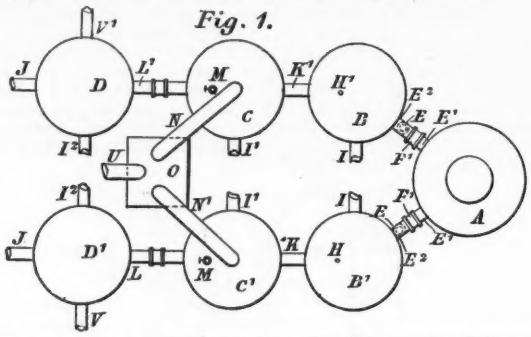


Fig. 1 is a plan view of the apparatus. Fig. 2 is a sectional elevation; the parts being represented as spread out in a plane. Fig. 3 is a front view and side elevation of a valve arrangement devised for the convenient reversal of the steam, and opening and closing of the proper water-gas delivery-pipes.

A is the generator, provided with gas take-off pipes E E¹ leading from the top and bottom of the generator to a common delivery-pipe E², and provided with valves F and F¹, by which either branch can be closed at will.

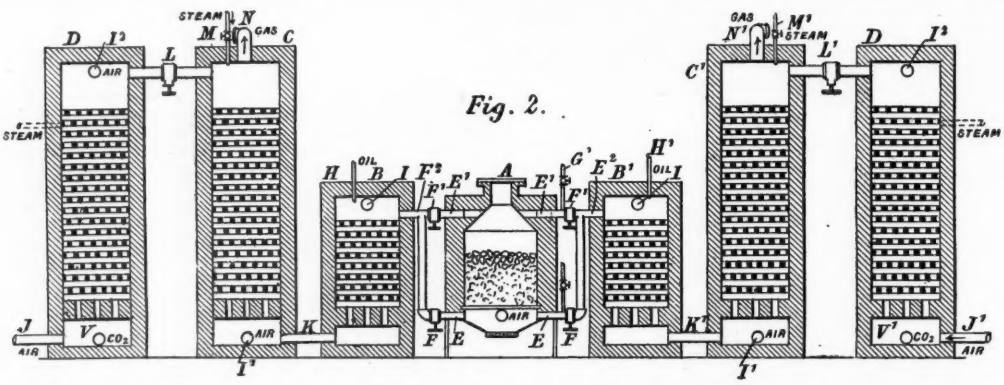


Fig. 2.

The gas take-off pipes are duplicated; one pipe E² leading to the carburetting chamber B, while the other leads to the carburetting chamber B¹. Each carburetting chamber is connected with a fixing chamber, C and C¹; connection being made by a conduit K K¹. D and D¹ are supplemental or independent regenerative chambers, which connect with the fixing chambers C C¹, through pipes L and L¹. G and G¹ are pipes by which saturated steam can be introduced either to the bottom or top of the generator. H H¹ indicate oil-supply pipes which lead into the carburettors. I, I¹, I² are connections from the air-blast (not shown) to the various regenerative chambers; air being admitted where secondary combustion in the chambers is desired. J J¹ are the air-blast conduits leading to each of the chambers D D¹. M M¹ are the two branches of the steam-supply pipe which lead into the two sets of regenerative chambers, and which enter the heads of the fixing chambers C C¹. N N¹ are the gas take-off pipes leading from the fixing chambers to a seal box O; U being the gas conduit leading therefrom. S S¹ are valves adapted to close the ends of the pipes N N¹, and secured to the ends of the levers pivoted at R¹; the lever arm R being provided, by which the levers, carrying the valves, are actuated, and their valves brought into operation—one pipe being closed, and the other necessarily opened, by the same motion. The lever R is actuated through a rod by means of a pivoted lever P P¹. The working arm of the lever is connected by a link with a lever which, in turn, is connected with the cock or valve by which steam coming from the source of supply is turned either into the pipe M or M¹.

The apparatus having been brought to a proper temperature throughout, manufacture of gas will be carried on as follows: First, assuming that the chambers on the left-hand side of fig. 2 are those most highly heated, the air will be forced into the chamber D through the conduit J. Passing through this chamber, it will enter the chamber C by means of the pipe L; thence pass through the conduit K and chamber B; and thence through the conduit E²—either to the top of the generator through the pipe E¹, or to the bottom of the generator through the pipe E, as may be desired. The blast gases pass through the chamber B¹; thence through the conduit K¹ to the chamber C¹; thence through the conduit L¹ to the chamber D¹; and then they escape through the take-off conduit V¹. Secondary combustion in each of the chambers through which the blast gases are passing is provided for by introducing air through the pipes I, I¹, I². The blast of air is then cut off, and steam introduced into the head of the chamber C. The steam sweeping through the chambers C and B becomes superheated; and the water gas formed in the generator by forcing the steam through the heated fuel passes through the chamber B¹ into which oil is also forced. The mixed gases then pass to, and are fixed in, the chamber C¹, from which they issue through the pipe N¹ and into the seal box. From the box O the gas is passed through pipe U to any convenient storage tank.

At the end of the gas making run, it is preferred to reverse the steam by moving the lever P, so as to cut off the steam from the pipe M and admit it in the pipe M¹—this same motion closing the pipe N¹, and opening the pipe N. The steam then sweeps backward through the chamber C¹ and B¹ to the generator; through it into the chambers B and C; and then through the pipe N to the seal box and delivery-pipe. This reversal of the gas which, of course, takes place after the oil is cut off at the point H¹, sweeps the rich gas out of the chambers C¹ and B¹, and forces a certain quantity of lean gas into and through the chambers B and C; no oil being introduced at H at this time. A layer of steam intervenes between the lean gas in the chamber C and the air in the chamber D; and when the right-hand side of the apparatus has been filled with steam and the left-hand side with lean gas, the steam is cut off by an independent valve. Air is next introduced into the independent chamber D¹ through the conduit J¹ and passed through the chambers C¹ and B¹ to the generator. The products of combustion then pass through, and are employed to heat, the chambers B, C, and D. Then the steam introduced is superheated in the chambers C¹ and B¹, and travels through the generator. The water gas then passes through, and is carburetted and fixed in, the chambers B and C, from the last of which it passes through the pipe N to the seal box. After this run the steam is again reversed by the lever P P¹; the apparatus swept out; and then again air is introduced through the chamber D.

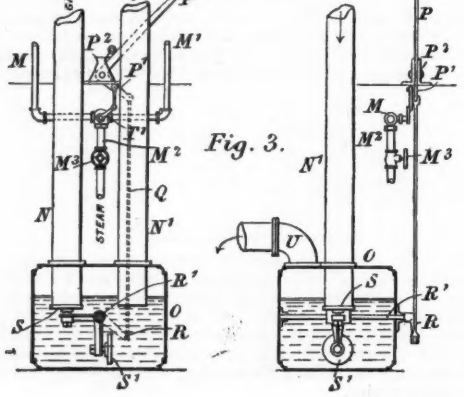


Fig. 3.

APPLICATIONS FOR LETTERS PATENT.

18,904.—Scarth, J. W., and Thornton, W. A., "Generation of acetylene gas." Aug. 16.

18,907.—Denich, A., "Producing acetylene gas." Aug. 16.

18,940.—Martini, A., and Deimer, F., "Gas ignition apparatus." Aug. 16.

18,971.—Wigham, J. R., "Manufacturing acetylene gas from calcium carbide." Aug. 17.

18,978.—Billing, C. E., "Method of, and means for, the economical use of gas for lighting purposes." Aug. 17.

18,989.—Maxim, H., and Graham, W. H., "Production of calcium carbide." Aug. 17.

19,096.—Hughes, T., "Coin-freed gas-meters." Aug. 18.

19,148.—Liddle, J., "Gas-meters." A communication from the International Meter Company. Aug. 19.

19,193.—Simms, F. R., "Explosion engines." Aug. 19.

19,211.—Nebendahl, C. F., "Automatic igniting device for gas-lamps or lanterns." Aug. 19.

19,308.—White, E. M., "Incandescent gas-lamps." Aug. 20.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The "Maintainable Profits" of Gas Companies.

Sir,—Mr. Livesey's letter in last Tuesday's "Journal" is opportune and to the point in many respects. Recent transfers of gas undertakings have shown that a cold-blooded onslaught in certain quarters is being made on the property of gas and water shareholders, which calls for exposure and the adoption of such measures as may be necessary to prevent the filching of these works from their rightful owners at prices far below their true or even their market value.

At the same time, I would point out to Mr. Livesey, if he will allow me to do so, that he is somewhat precipitate in one or more of the judgments expressed in his letter.

No one who is familiar with my views and my work for many years past will accuse me of any attempts at whittling down the value of these undertakings. I have even endeavoured, with what poor efforts I have been able to bring to bear, to show that in many, if not in most cases, arbitration nowadays is only another word for confiscation.

And yet I have accepted the principle of ascertaining the maintainable profits. There are a dozen good reasons which I could give (if I emptied my bag) to show why, if equal justice is to be done, it is necessary to determine the maintainable profits in a concern that is about to be transferred to a local authority.

Take, for example, in the case particularly of a non-statutory company, where there is no limitation of dividend, the amount expended on repairs and renewals during the particular year on the profits of which the valuation is to be based. It is unreasonable to say that the expenditure under this head should not be raised to the yearly average over the life of the works, if for the year in question it is found to be below it, and the balance of profit reduced in proportion. *Vice versâ* (for the principle cuts both ways), if the cost of repairs and renewals is in excess of the average, it would be equally wrong to contend that a deduction should not be made from the amount, and the profits of the year increased accordingly. Other adjustments besides wear and tear are sometimes imperatively necessary. If Mr. Livesey, or anyone else, thinks otherwise, and were to insist on expressing such a view in an arbitration inquiry, he would make a poor show in the hands of an opposing counsel with any cross-examining ability.

Again, take the case of a statutory concern in which the gas consumption shows, not simply a bare yearly increase, notwithstanding a low charge for the gas, but an actual falling off instead of a growth (I know of more than one such instance), in consequence of which the profits are reduced below what is required to pay the maximum statutory dividends. Would it be reasonable in such a case to ignore that fact, and claim maximum dividends as the basis of valuation, even although the perfectly legal action of raising the price of the gas to restore the dividend amount could be resorted to? I think not. Account should fairly be taken of such a circumstance, and the dividend sum brushed aside. Nay, would it not be a dereliction of duty—or, to adopt Mr. Livesey's strong phrase, a robbing of your clients, the purchasing authority—for a valuer to refrain from making close scrutiny into the maintainable profits under such circumstances?

If the selling price of the gas is so-and-so, you cannot with impunity raise it and still expect to command the consumption and the profits. You cannot play ducks and drakes with your selling price at will. An increase in the price in many instances might have the opposite effect to that of restoring the dividend. And it would hardly be fair to put upon the shoulders of the purchasing authority the onus of raising the price with the view to their increasing the profits to admit of the payment of interest and the provision of the required sinking fund.

It is easy to be off-hand and positive in expressing one's views where no immediate responsibility attaches to one's utterances; but actual contact with a concrete example, and the responsibility of dealing with it and advising upon it, sobers the judgment, and tends to moderate one's language.

Granted that, with South London at one's back, with all its possibilities of limitless expansion, the dividend is secured. In such a case, the profits representing the amount of such dividend are the proper basis of valuation.

There are, of course, many other concerns, equally with the South Metropolitan, that are thus happily circumstanced; but the fact that there are numerous exceptions should prevent our making the sweeping assertion that the full dividend figure, and that only, should be accepted in every instance as the basis of valuation.

The evils of which Mr. Livesey speaks, and to which I have referred in the opening of this letter, do not arise from the strictly honest and laudable effort to determine the maintainable profits, even if, in so doing, it involves the adjustment of the revenue account, but in the unscrupulous conduct of witnesses and counsel, who, in many instances, do not try to get at the actual facts, but, on the contrary, cloak or distort them, that they may gain an advantage for their employers.

Several miscarriages of justice have recently taken place. Arbitrators or umpires have shown themselves prone to accept the purchaser's point of view, with all the exaggerations of his advocates, rather than that of the seller; presumably acting on the socialistic principle that, right or wrong, they must consider the good of the many (the public) rather than that of the few (the shareholders). Besides, and by reason of the injustice of it, a policy of this kind lowers the moral standard, and must, if persevered in, bring disaster sooner or later.

Thomas Newbigging.

Manchester, Aug. 27, 1897.

Gas-Testing in London.

Sir,—The letter published in your issue of the 17th inst., from Mr. J. V. Taylor, on the above subject, was well to the point. The conditions of London gas-testing are undoubtedly at present more exigent than they were in the past; and there is absolutely no need to resort to the extraordinary expedient of employing a photometrical perambulator to detect any nefarious practices of a Gas Company, when it is a well-known fact that gas, even when legitimately manufactured, cannot be guaranteed to travel unlimited distances through small services without some deterioration of illuminating power.

Some years back it was considered in many cases a sufficient test to ascertain the illuminating power of the gas at a distance of not less than 1000 yards from the works, on a leading main. There was no suggestion or predisposition to test gas at odd corners, or up bye-streets.

The construction of the Act of Parliament, that 16-candle gas should be supplied, was considered to be amply fulfilled for public requirements if the main bulk conformed to what was considered necessary. In addition to this, the period of testing was limited to the maximum hours of gas supply; the idea being evidently that of giving the public the best illuminating gas at the particular period when it was most necessary. "*Nous avons changé tout cela.*" At the present time, an official Gas Examiner can attend to perform his experiments at any period of the day. Further than this, he has strict instructions from the local authority to make certain tests every month early in the morning and late at night. The number of testing-stations has been vastly increased. With the unlimited time at which a Gas Examiner can attend (as against the old limited period) and the multiplication of testing-stations, what more can be required as to the protection of the public from the supply of gas of inferior illuminating power? In addition, it is far fairer to conduct tests under proper official conditions at testing-stations duly approved by certificated authorities than to brand any particular Gas Company with a stigma of sending out inferior gas on the basis of an indiscriminate test made up a bye-street under unofficial conditions.

No reason that is a reason has been shown for deviating from the present system of testing gas at fixed and legalized testing-stations. It is really to the interest of the consumer as much as to the Gas Company that this course of procedure should not be departed from. It is a well-known fact that the Gas Companies have to incur a serious expense to raise the normal illuminating power obtained from ordinary coal, even of the best quality, to the 16-candle standard required to fulfil the parliamentary regulations at the official testing-stations. It is also a well-known fact that, with Gas Companies working under the sliding-scale, the consumer profits as well as the shareholder; and it is, therefore, not to the consumers' interest to take steps to increase the price of gas.

The question pure and simple of illumination is, in my opinion, not of such value as it was years ago. Sugg's "London" argand, by which the illuminating power is officially valued, gives very much less lighting effect than can now be obtained by private consumers using improved burners. Then, in addition, with the increase in the consumption of gas for motive power and for heating and cooking purposes, everything tends to give the average consumer a direct interest in keeping down the price of gas. The effect of the introduction of the perambulating photometer would be that the price of gas would be raised, from the fact that more enrichment would be necessary; and the advantage to the consumer, taking all circumstances into consideration, would be doubtful.

Aug. 26, 1897. H. Leicester Greville.

Basingstoke Water Supply.—The Basingstoke Town Council have been for some years discussing the extension of their water supply, and have spent large sums on experiments. They have now resolved to apply to the Local Government Board for permission to borrow another £1000 for the purpose of testing the yield of the well at Sherborne Bottom.

A Heavy Compensation Claim in Connection with the Brighton Water-Works.—The Brighton Corporation have received a claim from the Bridgers' Trustees for £65,000 compensation for their interest in the land of the estate required by the Corporation for the purpose of the water-works at the Spring Dyke at Old Shoreham. After consulting with Messrs. Clutton and Mr. C. Hawksley, M.Inst.C.E., the Corporation have offered £4000.

The Billericay Gas-Works have been purchased by Mr. Worthington Church, of the Midland Coal and Cannel Company. The valuation was made by Mr. E. W. Smith, of the Chelmsford Gas Company, on behalf of the purchaser. The Billericay Company, which was formed five years ago with a share capital of £5000, of which about £2000 has been paid up and £825 raised on loan, will now be wound up; and Mr. J. Paxton Clarkson, F.S.A.A., the Secretary, has been appointed Liquidator.

The Limerick Gas Managership.—A fortnight since we noticed the death of Mr. W. Spillane, who had been Manager of the Limerick Corporation Gas-Works for some 22 years; and the same issue of the "Journal" contained an advertisement asking for applications for the vacant post. It appears, however, there subsequently arose some doubt as to what body has the power of election—whether the Gas Committee, consisting of five gentlemen, or the whole body of the Corporation. This legal question had to be settled for the citizens by competent authority; and the Law Officers of the Crown were consulted. The Irish Solicitor-General (Mr. Kenny, Q.C.) and Mr. George Wright, Q.C., who was referred to by the Gas Committee, have both stated that, in their opinion, the election of a Gas Manager in succession to the late Mr. Spillane, according to the Act of Parliament, rests with the Gas Committee. The Attorney-General's (Mr. Atkinson's) opinion has not yet been received.

Novel Method of Protecting Non-Unionists.—Managers of gas-works who have unfortunately had to pass through labour troubles have experienced the difficulty of protecting those of their men who remained loyal and others who took the places of the strikers. The only way of effectually doing this was to lodge and provision them upon the works. In the present strike of engineers, a trouble has been experienced in filling the places of the strikers by non-unionist hands, in consequence of their having to "run the gauntlet" of the pickets when going to and fro from their works. To overcome this obstacle, Messrs. Yarrow and Co. have chartered the Royal Mail steamer *Southampton*, and the vessel is moored opposite their yard at Poplar. She has lately been taken off the passenger service between Southampton and the Channel Islands, and is well fitted up for the accommodation of 150 passengers; and upon this vessel the new hands are comfortably quartered, free from the annoyance of the pickets. It appears there are plenty of non-unionist men who are only too willing to secure employment, provided they can have the protection they are justified in expecting.

MISCELLANEOUS NEWS.

PROVINCIAL GAS AND WATER COMPANIES.

Gas Companies.

The Directors of the Aldershot Gas and Water Company reported, at the recent half-yearly meeting of shareholders, an increased consumption of gas, as compared with the corresponding period of last year, to the extent of 4,084,100 cubic feet, or nearly 9 per cent. This was principally in Aldershot; the Government supply remaining about the same as before. The receipts for gas and meter rents were higher by £558; but the returns from residuals decreased £108. The revenue from the supply of water increased in the town; but the War Department took less than in the corresponding period of 1896. The total receipts were £11,921; the expenditure was £8212—leaving a balance of £3709 to go to the profit and loss account. The amount available for distribution was £6915; and the Directors recommended a dividend at the rate of £11 13s. per cent. per annum on the "A" shares, and of £8 13s. per cent. per annum on the "B" shares, less income-tax.

At the half-yearly meeting of the Altrincham Gas Company last Tuesday, the Directors reported that the profit made in the six months ending June amounted to £3530, as compared with £3422 in the corresponding period of 1896. The price of gas was reduced 2d. per 1000 cubic feet during the second quarter of the half year; making a reduction of 4d. per 1000 cubic feet since the 1st of January. The total revenue was £9971; the expenditure, £6441. The amount available for distribution was £3920, out of which the Directors recommended the payment of the full statutory dividends, amounting to £3141. The quantity of gas sold was 54,371,265 cubic feet, as compared with 50,754,364 cubic feet in the corresponding half of 1896. The bulk of coal and cannel carbonized under the supervision of Mr. J. E. Lamb, the Company's Manager, was 3859 tons and 2158 tons; and the make of gas, 59,422,000 cubic feet. The following were the estimated quantities of residual products: Coke, 3944 tons; tar, 419 tons; ammoniacal liquor, 694 tons.

The accounts to be presented at the half-yearly meeting of the Brighton and Hove General Gas Company on the 10th prox. show an increased sale of gas in the six months ending June 30, but, on the other hand, a further decrease in the value of residuals. The demand for gas stoves and fires continues to extend; and this department is becoming an important branch of the Company's business. The receipts from the sale of 459,545,500 cubic feet of gas for private and public lighting amounted to £64,604; from the rental of meters and fittings, to £2854; and from residuals, to £11,481—the total revenue being £79,185. The expenditure on the manufacture of gas was £40,798 (coals, oil, &c., costing £27,576); distribution came to £7331; and management to £4181—the total expenses being £55,923. The amount carried to the profit and loss account is £23,262; and the balance available for distribution is £27,933. The Directors recommend the declaration of dividends at the rates of 11½, 8½, and 6 per cent. per annum on the several classes of stock. For the payment of these, £23,308 will be required; leaving a balance of £4625 to be carried forward. Important reductions have been made in the price of gas in the outlying districts, as from the 1st ult.; 1s. per 1000 cubic feet having been taken off in Patcham and Rottingdean, 9d. in Old Shoreham and Lancing, and 5d. in Portslade, Southwick, Kingston, and Shoreham. Under the superintendence of the Company's Engineer and Manager (Mr. J. Cash, M.Inst.C.E.), 33,634 tons of coal and 362,896 gallons of enriching oils were employed in the manufacture of gas in the past half year; and the estimated quantities of residuals produced are given as follows: Coke, 20,669 tons; breeze, 1874 tons; tar, 494,574 gallons; ammoniacal liquor, 672,937 gallons.

The Directors of the Brynmawr and Blaina Gas Company, at their meeting on the 20th inst., received the Auditors' report and statement of accounts for the six months ending June 30. The Chairman (Mr. J. Phillips, J.P.) said the result of the half-year's trading was highly satisfactory; and, notwithstanding that the price of gas had been reduced by 6d. per 1000 cubic feet as from the 1st of January, the profit made was more than enough to pay an interim dividend for the half year at the rate of 10 per cent. per annum. The report of the Secretary and Manager (Mr. T. Acland) showed an increased quantity of gas sold on a reduced make at the works, which meant a reduction of 1·79 per cent. in the leakage as compared with the corresponding period of last year. This was regarded as very gratifying. During the period covered by the accounts, the No. 2 gasholder at the Blaina works was rebuilt, enlarged, and telescoped, from designs prepared by Mr. Acland; the work being executed by Messrs. Willey and Co., of Exeter. The whole structure, gasholder and framing, is of steel throughout, and forms a very important addition to the plant. The Directors accorded a hearty vote of thanks to the Manager for his unremitting efforts in the Company's interest.

The half-yearly meeting of the Colchester Gas Company was held on Friday, the 20th inst. The accounts presented showed that the income had been £11,284, and that there was a balance of £2280. The assets amounted to £19,045; and after deducting liabilities, there was a balance of £11,587, which included £144 the balance of capital account. The financial statement was adopted; and it was resolved that a dividend of 10 per cent., free of income-tax, should be paid upon the old shares, and 7 per cent. on the new shares, for the year ending June 30.

The half-yearly general meeting of the Cork Gas Consumers' Company was held on Thursday, Mr. G. Lynch presiding. The accounts presented showed an increased consumption of gas in the six months ending June, as compared with the corresponding half of 1896; but the returns from residuals were low, in consequence of the continued depression in the markets for sulphate of ammonia and tar products. The total receipts amounted to £25,521; and the expenditure was £17,868—leaving £7653 to go to the profit and loss account. The balance available for distribution was £5661; and the payment of the usual dividend, at the rate of 8 per cent. per annum, was recommended. This would leave £9 to be added to the reserve fund. The Resident Engineer (Mr. T. P. Travers, Assoc.M.Inst.C.E.) reported that, while in retort power there was a reserve to meet an increasing demand for gas, the condensing plant would require enlargement shortly. The new sulphate apparatus had been at work since the 1st of April, and had realized anticipations. The production of sulphate was above the average of places using similar coals; and the cost of producing it had been considerably reduced. The general plant had been maintained in good working order. The recommendation was agreed to.

The accounts for the six months ending June 30, which will be presented at the half-yearly meeting of the Dover Gas Company on the 6th prox., show that the sale of gas produced £11,512; residuals brought in £3577; and the total revenue was £15,901. The expenditure being £12,786, there was a balance of £3115. This added to the amount brought forward on the profit and loss account (£3031) makes £6146; and the Directors will recommend the declaration of the usual dividend at the rate of 7½ per cent. per annum, less income tax. There was the ordinary increase in the sale of gas; and in other respects the position of the Company is reported as eminently satisfactory.

Under the presidency of the Chairman (Dr. G. A. Jeffery, J.P.) the half-yearly meeting of the Eastbourne Gas Company was held on Monday last week. The accounts presented showed a profit of £6366 for the six months ending June 30, which added to the £11,288 brought forward, and £84 interest, made £17,738 to the credit of the profit and loss account. The Directors recommended dividends at the rates of 14 and 11 per cent. per annum, after payment of which there would be a balance of £11,889. The Chairman, in moving the adoption of the report, referred to its satisfactory character, and went on to allude to the action of the South Metropolitan Gas Company in connection with the increase in their local rates. He said Assessment Committees seemed to raise the rates of gas and water companies in a most unfair degree; and he thought they ought to take a little more pains when assessing public companies. Though a London Gas Company had said to the various parishes: "You have raised the assessment, we will raise the price of gas," they in the country would prefer lowering it. The highly satisfactory state of the Eastbourne gas undertaking was due in a great measure to the labour, thought, and care bestowed on the work of the Company by the Directors, who had every assistance from their able Consulting Engineer (Mr. H. E. Jones, M.Inst.C.E.), as well as from the Secretary (Mr. J. H. Campion Coles) and his staff. Very great credit indeed—he could hardly speak too highly on this point—must be measured out to their Manager (Mr. J. Hammond), by whose careful and wise management they had arrived at the present excellent state of affairs; and they had also had the hearty co-operation of their workmen. The consumers were the customers of the Company, and were really partners with the shareholders in an undertaking like this. He had had the pleasure for many years past of announcing, on behalf of the Directors, a reduction in the price of gas. He recollected the time when it was 6s. 8d. per 1000 cubic feet. It now stood at 3s. Notwithstanding the low returns from residuals and the high price paid for coals last year, the Directors had decided to reduce the price of gas. The reduction would take place, not from October next but from June last; and it would be 2d. per 1000 cubic feet. This would entail a loss to the Company of something like £1800 a year; but they hoped that by the increased consumption they would soon wipe this out. Those who burned gas in Eastbourne would, at the reduced price of 2s. 10d., have the cheapest light of the day; and the incandescent lamp would give them the most brilliant one. He was quite sure the consumers would esteem this a great boon; but their Jubilee Year would be hardly complete unless they offered some other advantage to those who most required it—viz., the artisan, the cottager, and the small householder. The Directors had taken this into consideration; and they intended now to introduce an automatic prepayment meter into every house where it was desired. They would take the fittings, the meter, and a small cooking-stove into every house at their own expense; and then they would supply gas by the "penny-in-the-slot" system. In this way the small householder would obtain the light he required, and would also have at his disposal a cheap method of cooking. The report was adopted. A vacancy having been caused on the Board by the death of Mr. Simmons, Mr. J. C. Towner was elected a Director. In returning thanks, he remarked, in reference to the Chairman's allusion to the price of gas, that he recollected it being 7s. 6d. per 1000 cubic feet; and he said he had sold the Company's £10 shares for £11 and £12, whereas now they fetched £33 3s. and £33 7s. 6d. The remuneration of the Directors was increased by £200 per annum; and the proceedings closed with the usual votes of thanks.

The half-yearly meeting of the Hastings and St. Leonards Gas Company will be held on Thursday, when the Directors will report a continued increase in the Company's business. The quantity of gas sold in the six months ending June 30 was about 11¼ million cubic feet, or 6·67 per cent. more than in the corresponding period of 1896. Unfortunately, the value of residuals has not improved—in fact, tar has still further receded. The Company's works have been reassessed, with the result that the rates have been largely increased. The sale of gas for public and private lighting produced £27,926; the rental of meters and stoves, £1572; and residual products, £6285—the total revenue being £35,951. The expenditure on coal and oil, including a sum of £2005 paid as coal duty to the Sanitary Authority, was £16,299—the total manufacturing expenses being £22,249. Distribution cost £1799; rates, taxes, &c., £1293; management, £1213. The total expenditure was £27,189. The amount carried to the profit and loss account is £8762; and the balance of net profit is £45,102. Out of this, the Directors will recommend the payment of the statutory dividends of 13 and 10 per cent. per annum upon the £25 and £20 shares. Under the supervision of Mr. C. E. Botley, M.Inst.C.E., the Company's Engineer and Manager, 16,533 tons of coal, 315 tons of cannel, and 63,450 gallons of oil were used in the manufacture of 172,822,000 cubic feet of coal gas and 16,425,000 cubic feet of oil gas—together, 189,247,000 cubic feet, of which 181,660,600 cubic feet are accounted for. The estimated production of residuals is: Coke, 10,327 tons; breeze, 849 tons; tar, 153,334 gallons; ammoniacal liquor, 340,826 gallons.

The statement of accounts of the Keswick Gas Company which will be presented at the meeting of shareholders on the 7th prox. shows a balance of £1272 on the year's working. This with £462 brought forward, makes a total of £1734. Deducting £88 for interest on loans and bank charges, there remains a sum of £1646. From this the Directors propose to set aside £110 for depreciation, and add £194 to the mortgage redemption account; leaving £1342 available for distribution. The Directors recommend a dividend of 8½ per cent. upon the original capital, and of £5 19s. per cent. upon the additional capital. This will absorb £845, and leave £497 to be carried forward.

The half-yearly meeting of the Pontefract Gas Company was held last Tuesday—Alderman Taylor in the chair. The report for the half year

ended June 30 stated that the amount divisible was £1296, out of which it was decided to pay the full statutory dividend of 10 per cent. per annum on the original shares, and 7 per cent. on the new ordinary shares. It was stated that the reserve fund amounted to £3033.

The half-yearly meeting of the Riddings District Gas Company was held at the London offices last Friday afternoon, when the accounts presented showed a balance of £1494 on the net revenue. The receipts in the six months ending June 30 were £1708; and the expenditure was £1131—leaving a balance of £577. The Directors recommended a dividend at the rate of 5 per cent. per annum, free of income-tax.

The annual meeting of the Salisbury Gas Company was held on the 18th inst.—Mr. G. Fullford presiding. In moving the adoption of the report and the payment of the usual dividends, he remarked that the income from the sale of gas had increased to the extent of £709 as compared with last year. There was also an increase in the receipts for coke and tar; but a decrease on sulphate of ammonia, due to its low market value. The Company were now developing a large local trade in sulphate; and he recommended those who were gardeners to make a trial of it, and ascertain for themselves its valuable manurial properties. The increased sale of gas of course meant higher working expenses; and in addition to these the new schedule for meter-rents involved a loss of £100, and the new assessment increased their rates to the same extent. The amount they had to pay for rates and taxes was £752, or more than 25 per cent. of the Company's net annual income; and it amounted to no less than 2½d. per 1000 cubic feet of gas sold. The Directors had been considering the position and prospects of the Company, and they had decided to make a reduction in the price of gas to ordinary consumers, of 1d. per 1000 cubic feet as from the 1st of July. The rate would now be 3s. 2d. This apparently trifling reduction meant a loss of £300 per annum; and with the reduced meter-rents it represented a concession of £400 per annum to the consumers. The motion was carried. In acknowledging a vote of thanks to the Chairman, Directors, and officers, Mr. Fullford said the Board were thoroughly satisfied with the way in which the affairs of the Company had been conducted by the staff; and he mentioned specially the services of the Secretary (Mr. A. Whitehead) and of the Manager (Mr. Norton H. Humphrys). With regard to the latter, he said Mr. Humphrys was meeting the additional responsibilities that came with the increased business in a manner that commanded their full appreciation and support. Mr. Humphrys, in responding, said the past year had been a record of steady progress; and he believed the additional business was of a permanent character. He recognized the demand for cheap gas, and therefore regarded the reduction made that day with satisfaction. At the same time, he believed that, with their improved plant and larger demand, this reduction was by no means the end of their tether.

At the annual meeting of the Sunderland Gas Company to-morrow, the Directors will have the satisfaction of reporting that the growing demand for gas, especially for cooking, heating, and power purposes, largely increased the consumption of gas in the year ending June 30. The total revenue from all sources in this period was £89,169; and the expenditure, £71,555—leaving a balance of £17,614. An interim dividend was paid in March; and the Directors recommend a similar payment of 5 per cent. on the original, and 4¼ per cent. on the additional capital stock of the Company. A new retort-house has been completed at Hendon; and it will be available for the manufacture of gas during the approaching winter.

The ordinary general meeting of the Tamworth Gas Company was held on Thursday—Dr. A. M. Sculthorpe presiding, in the absence of the Chairman (Mr. M. S. Wales) through indisposition. The report presented stated that the profit for the twelve months was £1193, after providing for all necessary outgoings. There had been an increase in the consumption of gas of 2,833,000 cubic feet, or 13·2 per cent., the total gas sold for 1896-7 being 24,297,000 cubic feet, against 21,464,000 cubic feet for 1895-6. The number of "penny-in-the-slot" meters and cookers in use had been increased from 150 to 400. The works, mains, and plant generally had been maintained in good condition; but further additions to the carbonizing plant had been agreed upon. The full statutory dividend of 20s. on each old share and 14s. on each new share for last half year, which, with the interim dividend paid in February, made 10 per cent. on the old and 7 per cent. on the new shares, was ordered to be paid. The Chairman remarked that, as the maximum dividends had been reached, the Directors' efforts in the near future would be to give the consumers the full benefit in the way of low prices. Votes of thanks to the Manager (Mr. W. A. Sapey) and the Chairman were passed, and the proceedings closed.

At the recent annual meeting of the City of Waterford Gas Company, the Directors reported a balance of £1536 to the credit of the profit and loss account; and they recommended dividends of 10 and 7 per cent. These would amount to £1242; leaving £294 to be carried forward. In moving the adoption of the report, the Chairman (Mr. R. Hesketh Jones, J.P.) congratulated the proprietors on the fact that during the past twelve months the Company had supplied more gas than in any previous year—viz., 50,324,000 cubic feet; and the current year would, he said, show a further increase, inasmuch as there would be 58 more public lamps lighted as from the 1st of September. There had been expended on capital account £3410 more than had been received; and therefore it had become necessary to call up the remainder of the "C" capital. It was now more than four years since a call was made. The revenue for gas supplied during 1892, the year before the last call, was £7461. For the year ending the 30th of June last it was £9913. The share and loan capital on Jan. 1, 1893, was £34,000; and on June 30, 1897, £37,000. The growth of the gas-rental during this period had been nearly 33 per cent.; while the increase in the share and loan capital had been less than 9½ per cent. The calls made and proposed to be made before the expiration of the present year were therefore fully justified by the increased business of the Company. Seeing the necessity for being in a position to meet the future requirements of the city in the matter of artificial light, and looking at the fact that the capital of the Company was exhausted, or will be so next spring, they must apply to Parliament for powers to raise more capital. In doing so, the Directors proposed to ask for authority to rearrange the capital, and make it a uniform 5 per cent. stock; and as they wished the consumers to become partners in the concern as shareholders they intended to ask for permission to issue all new capital to the consumers at par, and if not so taken up, to sell it by public auction in Waterford. He expressed the hope that the Bill might not meet with opposition. Mr. Anderson said he was rather opposed to leaving the old shareholders out in the cold by this arrangement, on the ground that when the Company was started the citizens of Waterford held aloof. The Chairman replied that, correct as this might be, the old shareholders should remember that the concern was a very good investment now, and one about which the old shareholders had no reason to complain. They could now very well resign a few of their privileges to the general public of Waterford, and in this way strengthen the position of the Company. Mr. Shaw said the Directors were of opinion that by their proposed action great benefit would be conferred upon the citizens and the old shareholders as well. The report was adopted. The usual complimentary votes of thanks were then accorded; the name of the Manager (Mr. Donaldson) being included, on the Chairman's suggestion.

The half-yearly report of the Wolverhampton Gas Company shows a net profit of £8945, which, added to the balance of the last account, makes £10,135. Out of this the Directors recommend the payment of dividends of 3 per cent. upon the preference stock, 5¼ per cent. upon the consolidated stock, and 3½ per cent. upon the new ordinary stock, less income-tax In the previous report, mention was made of increasing the manufacturing plant at the Stafford Road works. The Directors have now under consideration plans and specifications for the required extension, which will be carried out without delay.

Water Companies.

The half-yearly general meeting of the East Worcestershire Water Company was held in Birmingham last Thursday—Lord Windsor presiding. In moving the adoption of the report, the principal portions of which were given in the "JOURNAL" for the 17th inst., his Lordship remarked that though the Company were not taking very rapid strides, real and solid progress was being made from one year to another. It would have been possible to declare a dividend of 3½ per cent.; but the Directors considered it would be unwise not to carry forward a considerable balance, in view of the further extension of the works. They believed that next year they would be in a position to declare an increased dividend. The motion was carried unanimously. This concluded the business of the ordinary meeting. An extraordinary meeting was then held, at which the Chairman moved that the Directors should be authorized to borrow any sum not exceeding in the aggregate £10,000, by the creation and issue of 3 per cent. debenture stock. He explained that the object was to pay off a mortgage of £8000, which had been bearing interest at the rate of 3⅝ per cent. per annum, and thereby to effect a saving of £50 a year. The motion was carried unanimously.

The annual meeting of the Lewes Water Company was held on Thursday, under the presidency of Mr. F. Verrall. The Directors reported that the receipts in the six months ending June 30 were £3654, and that the expenditure was £1332; leaving a balance of £2322. An interim dividend paid in February amounted to £1035; so that there was £1287 available for distribution. The Directors recommended dividends of 5, 6, 3½, and 2½ per cent. on the various classes of shares and stock—making 10, 7, and 5 per cent. for the year—and the payment of £1 per share to the holders of original shares, on account of arrears due to them. These payments would absorb £1275, and leave a small balance to go to the reserve fund, which would be brought up to £330. In moving the adoption of the report, the Chairman stated that there had been 112 new services put on during the year, which showed that the public were well satisfied with the supply and with the water itself. The average daily consumption per head was 28 gallons—*i.e.*, 20·063 for domestic purposes, 7·301 for trade uses, and 1·093 for Town Council uses. The Directors had no doubt as to the quality of the water; but they thought it would be more satisfactory for the town to be made aware of its excellence. They consequently forwarded a sample to an analyst in London, who reported that the water was of high-class purity. The report was adopted; and the dividends recommended were declared.

At the half-yearly meeting of the Sevenoaks Water Company on Friday, the Manager and Secretary (Mr. F. Hunter) presented the Directors' report, which showed that the balance at the credit of the profit and loss account amounted to £1355. Out of this, dividends were recommended of 8 per cent. per annum on the consolidated stock, and £5 12s. on the share capital. The payment of these dividends would absorb £1016, and leave £339 to be carried forward. The recommendations were agreed to.

In moving the adoption of the report at the meeting of the South Essex Water Company on Monday last week, the Chairman (Mr. J. C. Amos) stated that during the six months ending June the capital expenditure included about £1200 for mains and extensions. After payment of the half-year's interest on the debenture stock, and setting aside £500 to depreciation and contingency account, and £500 for water royalties, there remained a net balance of £10,260, including the sum brought forward. Besides paying the 5 per cent. dividend, free of income-tax, for the six months, on the preference stock, the Board felt justified in recommending the declaration of a dividend on the ordinary stocks of 1861 and 1882, free of income-tax, at the rate of 6 per cent. and £4 4s. respectively; leaving £5377 to be carried forward. The continuous and increasing demand for water was engaging the attention of the Directors; and, so far as they could see, this would require a further outlay for extensions, and also for additions to trunk mains. A new pumping main from Romford to the Hog Hill reservoir was already in progress. There was a new item in the accounts of £500 water royalty at Grays, paid after negotiation and mutual concession to the representatives of the late Mr. R. Meeson, in settlement of all claims for royalties up to June 30, 1897, under the old agreements of 1862; and a new agreement had been entered into, settling on a permanent basis the payment of future royalties. This item had not hitherto appeared, as the agreement did not take effect until the Company was paying a 6 per cent. dividend. He concluded by complaining of the large quantities of water consumed by the use of garden hose; and he remarked that while Magistrates imposed only small fines on offenders, the Board would have great difficulty in dealing with the matter. The report was agreed to.

Special interest attaches to the half-yearly meeting of the South Staffordshire Water Company, which was held in Birmingham on Thursday, under the presidency of Mr. Frank James, from the fact that it afforded the Chairman an opportunity of alluding to the recent decision of the Court of Appeal in the action brought to determine the charges

the Company are entitled to make in the neighbourhood of Burton-upon-Trent (see *ante*, p. 275). Having moved the adoption of the report (noticed in the "JOURNAL" a fortnight ago), which he thought very satisfactory, he referred to the item of £315 for current law charges, and explained the circumstances under which the Company had been engaged in litigation. He said that in 1853, when the Company first went to Parliament, they obtained power to charge water-rates on the annual value of the premises. They afterwards acquired the powers conferred by the Burton-on-Trent Water-Works Act, 1861, in which the words "rack-rent" appeared instead of "annual value." Up to 1883, these terms were held to be synonymous. The Dobbs case, however, put a different complexion upon the matter; and the Company had to reduce their rates in the part of the district covered by the Act of 1853, to the basis of the annual value instead of the gross estimated rental of the premises. They held to the belief, however, that, under extended powers conferred upon them in 1866, they were entitled to charge the district in the neighbourhood of Burton on the same terms as Burton proper; and a consumer at Winshill having refused to pay the rate demanded, litigation resulted. The point involved was whether he should pay on the net annual value or the gross estimated rental; and the local tribunal, the Queen's Bench Division, and the Court of Appeal had declared against the Company. They intended to abide by these decisions so far as Winshill was concerned. Indeed, it was a matter which was not of particular importance—the difference involved not amounting to more than £50 a year. As showing that the Company were not unjustified in contesting the point, however, the Master of the Rolls stated in his judgment that the question was enshrouded in such ambiguity that it might be decided by the throw of the dice or the toss of a penny. Moreover, the rights the Company believed they possessed had been acquiesced in for thirty years by the consumers. But there was a rule of law, wherever such a case was ambiguous, to give it in favour of the individual. So far as they could read the judgment, it was applicable only to the particular portion of the district outside Burton, and did not touch in any way the right of the Company to charge on the annual rack-rent within the limits of Burton under the 1861 Act. He was not going to disguise from the shareholders the fact that there was a feeling in Burton antagonistic to the view the Directors took. The people there were eager now to take the water supply into their own hands; but they did not manifest any anxiety in this direction till others had carried it through the experimental stages to success. Though he was Chairman of the Company, he was not ashamed to say he still believed that, as a general rule, it was desirable that the water supply of a town should be in the hands of the corporate authority. But the authority should create the supply, and not acquire it; or, if they acquired it, it should be as a whole, and not piecemeal. The Company had not the slightest desire for litigation. They had done everything they possibly could in the interests of Burton, by furnishing an additional supply of water; but, if compelled, they would proceed against anyone for the purpose of recovering that which they believed was their due. If the rates in Burton were resisted, nothing short of a judgment of the House of Lords would settle the question. The principle of the charge was distinctly and clearly laid down in the Act of 1861; and by this the Company intended to abide. The report was adopted.

At the half-yearly meeting of the Truro Water Company last Wednesday, the accounts presented showed receipts to the amount of £1095, of which £661 was for water supplied for domestic purposes, and £434 for meter supplies and rents. The expenditure being £497, there was a profit of £598 on the six months' working. The Directors recommended the payment of a dividend at the rate of 4 per cent. per annum, amounting to £320, out of the balance standing to the credit of profit and loss account, and the transference of £250 to the capital account—the balance to be carried forward. The Engineer (Mr. E. Trestrail) reported that the whole of the pumping plant was in excellent condition, and that the economy in fuel consumption was still being maintained. The recommendations were agreed to.

CROYDON COMMERCIAL GAS COMPANY.

The Ordinary Half-Yearly Meeting of this Company was held last Wednesday, at the offices, Katharine Street, Croydon—Mr. CHARLES HUSSEY, J.P., in the chair.

The SECRETARY (Mr. W. J. Russell) having read the notice convening the meeting, the report of the Directors (see *ante*, p. 441) was presented. It showed a divisible balance of £14,682 4s. 1d.; and the Directors recommended dividends at the rates of 14, 11, and 9 per cent. per annum (less income-tax) on the various classes of stock.

The CHAIRMAN, in moving the adoption of the report, remarked that it was his privilege to propose the first resolution at this the hundred-and first half-yearly meeting of the Company; and in doing so, he must say that it gave him very great pleasure indeed, as he thought that all the proprietors who had read the report and seen the accounts would agree that they were most satisfactory. He had nothing special to put before them. Still there were a few details and matters that had taken place during the half year which might be of interest. The first thing that they naturally touched upon in the report was the increase in the sale of gas, which had been 9·32 per cent., compared with the corresponding six months of 1896—an increase which he thought was very satisfactory indeed. He had looked through the reports of various other gas companies; and he could only find two or three who had beaten their Company at all in that respect. In the case of one Company, of which their friend Mr. Corbet Woodall was Chairman, there had been the extraordinary increase of 17·58 per cent. He thought this large increase had been caused by the adoption of prepayment meters; and this had also affected their Company to some extent. But they must remember that this year in Croydon they had had the full blaze of the electric light, whereas they did not have it to contend with in the corresponding half year of 1896. If it had not been for this, the increase in the sale of gas would have been considerably larger. Their near neighbour, the Crystal Palace Company, had secured an increase of 8 per cent.; and the South Metropolitan Company, one of 10 per cent. These were the highest figures representing an increase that he could find in the report of any company. The total number of meters in use at Midsummer last was 11,448, of which 8766 were ordinary, 2531 prepayment, and 151 automatic; the increase over the corresponding period of last year being 453 ordinary, 666 prepayment, and 144 automatic meters. They had secured no less than 1263 new consumers during the past twelve months—a very satisfactory increase. The number of gas cooking and heating stoves on hire at Midsummer last was 4130; being an increase of 742. There was no doubt that there were many more than this in use, because some people preferred to buy the stoves right out. The number of public contract lamps was 2039; being an increase of 37 over last year. This would very naturally seem to be a small increase; but, of course, they had had to take down several lamps that were in use in the area now covered by the electric light. They had, however, fitted 636 lamps with incandescent burners. Turning to the accounts, he said that on capital account the receipts to Dec. 31, 1896, had been £340,820. They had sold during the half year £5000 of "B" ordinary stock, which realized £13,748. He thought all must be perfectly satisfied to find that the Company stood in such a position that people were ready to invest their money to obtain a return of only about 4 per cent. The total receipts to June 30 last were thus £354,626. Taking next the expenditure on capital account, they had spent £4344 in the past half year, of which £738 was for new buildings and plant, £881 for new mains, £1095 for new meters (which included the cost of 560 new meters for additional consumers), £1263 for new gas-stoves (379 additional stoves having been fixed during the half year), and £365 for new gas-fittings for houses. This left a balance on capital account of £5867. On the revenue account, they had received from the sale of gas to ordinary consumers £42,774, as against £39,136 in the corresponding half of last year; from rental of meters, £1051, as against £932; from rental of gas-stoves and house-fittings, £1201, as against £971. Passing on to the sale of residual products, he was sorry to say, he had a very poor account indeed to give. There had been scarcely any improvement whatever—in fact, some had gone down. Coke had realized 6·04d. per cwt., against 6·17d. in 1896; breeze, 1·67d., as against 1·55d.; tar, 1·66d., as against 1·99d.; and sulphate of ammonia, £7 10s. 6d. gross, as against £6 17s. 5d. The total receipts on account of revenue had been £56,956. On the expenditure side, coals and oil had cost £21,199, against £19,782. He explained that their contract for coal expired on June 30; and they had consequently to enter into a new one. He was sorry to say that, after trying their best to get the contract renewed at the old prices, they were obliged to give 2d. per ton more for two years. Purification cost £601, against £563; and repairs and maintenance of works, &c., £3872. Public lighting and repairing cost £1256, as against £1035; and rates and taxes, £2402, as against £3130 last year, when arrears were included that were allowed to run on until the appeal against their assessment was concluded. In future the amount would stand at the lower figures, until they had another assessment or an increase of the rates. There was another item which must be considered as being satisfactory, and that was bad debts, which amounted to only £77. This he thought was a very small amount considering their large revenue. Law charges were nearly £8, compared with £3 last year. The workmen's sick and burial and superannuation funds stood about the same. In regard to these funds, he thought it was money well spent, conducing as it did to the existence of good feeling and that harmony which Mr. Helps informed him prevailed among the men. There was a total expenditure on revenue account of £42,008; and a balance of £14,947 to be carried to net revenue account. The amount available for division was £14,682. The half-year's dividends would absorb £14,536; and this would leave a balance of £145 to be carried forward to the next account. This did not seem a large amount; but still it was a most satisfactory one. He thought every proprietor present ought to be thoroughly satisfied with the accounts. He was told by Mr. Helps that all their plant was in a very efficient state; and everything that had been done to keep the works in a proper condition had been paid for out of revenue account, so that they might feel they were in a still most satisfactory position, having nothing to meet in that direction.

Mr. A. J. LAMBERT seconded the resolution, which was carried.

Mr. CORBET WOODALL moved that the dividends recommended should be declared. He remarked that it must be gratifying to the shareholders to know that, while in the year they had had an increase in revenue of about £4000, nearly half of it had gone straight into profits, which to his mind was eminently satisfactory. The profit balance was increased by £1800 last half year, while the increase in revenue was nearly £4000.

Mr. G. J. B. JACKSON seconded the motion; and it was carried.

A vote of thanks was accorded to the Directors, as well as to the officers and staff, and the proceedings terminated.

BARNET DISTRICT GAS AND WATER COMPANY.

The Half-Yearly Meeting of this Company was held last Friday, at the Albion Tavern, Aldersgate Street, E.C.—Mr. JAMES GLAISHER, F.R.S., in the chair.

Mr. SAMUEL WOOD, F.S.A., in the absence of the Secretary (Mr. Alfred Lass, F.C.A.), read the notice convening the meeting; and the accounts, to which reference was made in the "JOURNAL" for the 17th inst. (p. 401), were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said he would first deal with the gas portion of their business. In the past half year they had carbonized 3865 tons of coal; being 231 tons more than in the corresponding period of last year. They had manufactured 40,879,000 cubic feet of gas; and the unaccounted-for gas amounted to 2,560,600 cubic feet, or about 6¼ per cent. of the make. This was a little higher percentage than last year; but he thought, considering the nature of their district and the length of the mains, that they must rest content with the present rate of leakage. He knew the Engineer was as careful as possible in this respect. They had sold 37,705,200 cubic feet of gas, which was an increase of 8½ per cent. He was sure the shareholders would be very well satisfied with this substantial increase. They had made 3681 chaldrons of coke during the half year, 108 chaldrons of breeze, 42,515 gallons of tar, and 40 tons of sulphate of ammonia. It would be seen from this that they had made more than a ton of sulphate for every hundred tons of coal carbonized, which proved that the work had been well carried out. Turning to the

gas accounts, they had paid for coal £2895; this being £123 more than last year. The smallness of the increase under this head was owing to the fact that they had obtained the coal 3½d. per ton cheaper this year than last. Purifying and wages had cost a little more this year, but the other items were less; so that manufacture of gas had only cost them £183 more than last year. The expenses for distribution were all less. On the other side of the account, they had received for private lighting £542 more than last year, and for public lighting £30 more. The returns from residuals were fairly satisfactory; the receipts under this head having been £158 more than in the corresponding period of 1896. All gas companies had not been so fortunate as this. The total receipts from the gas portion of the undertaking were £9128, and the expenditure £5886. This left a profit of £3242 on the half-year's working, or £658 more than in the corresponding six months of the previous year. Turning to the water portion of the undertaking, all the items under the heading of maintenance were less, with the exception of rates and taxes, which had increased by £28. They would recollect that in the accounts for the first half of last year there were two special items of expenditure—the Friern Barnet constant supply inquiry £136, and the Potters Bar sewage farm inquiry £228—which did not appear on the present occasion. The total expenditure on water account during the six months had been £3319, or £557 less than last year. The receipts from water had been £9856, or £237 more than in the first half of 1896. There had thus been a profit of £6536, or £794 more than last year. It would therefore be seen that the gas and water departments were both progressing satisfactorily. The shareholders would remember that last year he held out a strong hope that the consumers at Barnet would never again be short of water. They had then been twelve months at work on the Potters Bar well; but the yield of water had not been such as to satisfy them. He wished to repeat that, cost what it might, they would have water. They would not cease spending money till there was enough water to supply the district to the satisfaction of everybody. At East Barnet, they had driven a borehole; and they had determined there to sink a well, which promised to give them nearly all the water they required. They had passed through a very trying season; and they had had to obtain a small quantity of water from the New River Company to enable them to supply their district.

Mr. Charles Horsley, J.P., seconded the motion, which was carried unanimously.

Dividends were declared at the rate of 9 per cent. per annum on the "A" and "C" stocks, 8 per cent. on the "B" stock, and £6 6s. per cent. on the "D" capital gas and water stocks, all less income-tax.

The Chairman then proposed a vote of thanks to the officials (Messrs. Lass, Martin, and Wright). He regretted very much the temporary absence of Mr. Lass, on account of his health.

Mr. I. A. Crookenden seconded the motion, which was carried.

A vote of thanks to the Chairman and Directors, on the motion of Mr. Sheppard, seconded by Mr. Lennard, concluded the proceedings.

LANCASTER CORPORATION GAS SUPPLY.

Increased Gas Consumption—The Prepayment System.

At the Meeting of the Lancaster Corporation last Wednesday, the Mayor (Mr. N. W. Helme), in moving the confirmation of the minutes of the Gas Committee, which showed a net increase of 1,106,120 cubic feet in the make of gas, and of £142 in the receipts for gas sold, in the quarter ending June 30, called attention to the fact that the extra quantity of gas consumed was more than a million cubic feet; being at the rate of 5 per cent. This, he said, was all the more satisfactory, as there had been a decrease of 47,317 cubic feet of gas burnt in the public and private lamps, resulting from the extended use of electricity. There had been a large increase in the amount received from the sale of residual products, due to the fact that in the previous three months a smaller sum had been derived from this source of income than the average; and a large stock in hand had since been turned into money. The condition of the works might be deemed thoroughly satisfactory. A smaller sum—£41 17s.—had been paid in wages, owing to the improved method adopted of setting the retorts, whereby they were able to produce a larger quantity of gas with less manual labour. Mr. Bowness, in seconding the motion, joined heartily in the congratulation that the introduction of electricity had not materially reduced the consumption of gas. The duty of the Council was to extend the sale of both gas and electricity as much as they could. Mr. Heald said he noticed that the sale of gas through prepayment meters was more than double what it was in the corresponding quarter of last year. He should like to be assured that this was not causing a loss to the Corporation. He saw from a report of the Manchester Gas Committee that they had 15,000 prepayment meters; that they sold gas at the rate of 25 cubic feet for 1d.; and that they had lost on this portion of their business £1300. The Mayor remarked that their Committee supplied 27 feet for 1d. Mr. Heald said this was more than the Manchester Corporation gave, and he should like to be assured that Lancaster was not losing money also. He should not like the Corporation to curtail the prepayment meter system; but they knew that this class of meter entailed more expense in collecting the money and looking after than the ordinary kind. The Mayor said they had now nearly 400 prepayment meters in use. The system offered a convenient arrangement for the very poor; and by it the Corporation were able to retain a large number of small consumers. They charged 3s. 1d. instead of 2s. 3d. per 1000 cubic feet for the gas consumed; and during the past quarter they received from prepayment meters £66 17s. 7d. They had thus made £22 clear profit beyond the ordinary price they obtained for gas. The prepayment meters cost £2 each, and the ordinary ones £1 each, and the expense of the 400 in use had been charged to revenue and not to capital account. Consequently, by the investment of an additional £400, they had a net increase of £22 a quarter clear profit. The financial aspect of the system was thoroughly satisfactory and sound; and the object the Committee had in view—the convenience of poor consumers—was also secured. Alderman Smith said he was thoroughly in sympathy with the object of the Committee; but he pointed out that the Mayor, though he had said there was no additional capital charge through the introduction of the prepayment meters, made no mention of the additional cost of labour necessary to look after them and the extra gas-fittings. He agreed that every facility should be given for securing an increase in the consumption of gas; but the Committee should make sure that this was not done at the expense of the town or of other consumers. The Mayor said no additional labour was employed for the collection of the money put into the meters, because capacity was provided for the reception of 4s. or 5s. worth of copper. He could assure Alderman Smith that the Committee, having regard to the interests of the town, felt that the prepayment system would be a great advantage. The motive, as he had said, was to meet the convenience of the poor, as well as to make additional money; and the increased income had justified the Committee's policy. The minutes were passed.

ROTHERHAM CORPORATION GAS SUPPLY.

The Extension of the Works Sanctioned.

A Special Meeting of the Rotherham Town Council was held last Tuesday, to consider the minutes of the Gas Committee, whose recommendations included the acceptance of tenders for extensions at the gas-works—of Messrs. R. & J. Dempster, Limited, for retort-house fittings, &c., £9286; and Messrs. Chadwick and Co. for brickwork, &c., £2743. Mr. Gummer, the Chairman of the Committee, in moving the adoption of the recommendations, said the extensions would provide the Corporation with a new retort-house, a bench of retorts of six beds, and something which was new to Rotherham—inclined retorts and regenerative furnaces. There would also be erected coal-breaking machinery, coal elevators and conveyor, coal hoppers, condensing main, tar main, weigh bridge, and weigh office. Mr. Winstanley, whom they had consulted, had laid down a condition that two beds of retorts must be completed by November next, the period of the year when the greatest strain was laid on the department. To do this, provision had to be made for a temporary roof, at a cost of £150, which was included in the contract. It was provided also that a continuation of the work should go on so that the whole of the six beds of retorts would be completed within six months of the letting of the contract. When the work was completed, they would have an additional capacity for 600,000 cubic feet per day; and this quantity, they supposed, would see them safely over the next two years. Mr. Winstanley had also assured the Committee that when the plant was completed, they might fairly expect to manufacture gas at 3d. per 1000 cubic feet cheaper than at the present time. If this was the case, they would be in the position which many of them had hoped for, of being able shortly to reduce the price of gas. It had been the desire of the Committee to let as much of the work locally as possible; and that was the reason why the contract had been split up into two sections. He was assured that Messrs. Dempster obtained the greatest portion of their iron at works just on the borders of the borough; and most of the men employed at the works lived in the borough. Mr. Mason seconded the motion. He said some of them hoped that after the present undertaking they would be able to embark upon an electric lighting scheme. They had reason to believe that the introduction of such a system would not interfere with, or (at all events) do away with the necessity of, an increased gas supply. Replying to Mr. Cox, Mr. Gummer said that the tenders recommended did not include the cost of additional purifiers. The purifiers would be able to deal with the present make of gas. This was work which would have to be done when they had carried out the whole of the scheme, and, as Mr. Winstanley proposed, reconstructed the old plant. Mr. Gummer further explained that at the present time only 80,000 cubic feet of gas per day was got out of the existing retorts; but Mr. Winstanley estimated that 25 per cent. more would be obtained from the new ones. The Mayor fully believed they would economize in the manufacture of gas, and save the 3d. per 1000 cubic feet without in any way interfering with the profits realized from the works. The resolution was passed unanimously.

CONSOLIDATION SCHEMES FOR GAS UNDERTAKINGS IN THE UNITED STATES.

We learn from American contemporaries that a scheme has been prepared for the consolidation of the Equitable and East River Gas Companies of New York. In a circular issued to the shareholders of the two Companies by the Central Trust Company, it is explained that the consolidation has become advisable by reason of the law recently enacted in regard to the reduction of the price of gas in the city. The association of interest thus provided for will enable the management of the Consolidated Company to introduce economies and to compete more effectively with the larger Companies. It is proposed to form a new corporation, and to exchange the shares of the present Companies for new securities as may be determined; and the Central Trust Company ask for deposits of the stocks of the two Companies, for which certificate of deposits will be issued. If before the 1st prox. more than two-thirds of the shares of the two respective Companies have been deposited, a plan of organization is to be issued within 30 days; and if before that time, or an extension thereof authorized by the Reorganization Committee, the requisite number have not been sent in, the share certificates will be returned. A Syndicate has been formed to buy for cash the stock of such depositing shareholders as may be dissatisfied with the allotment of new securities under the plan. The Syndicate will pay in cash $230 for each share of the Equitable Gas Company's stock, $115 for each share of the New York and East River Company's preferred stock, and $80 for each share of their common stock. The Equitable Gas Company have a capital stock of $4,000,000 first mortgage 6 per cent. bonds, amounting to $1,000,000, and an authorized issue of $4,000,000 of consolidated mortgage 5 per cent. bonds, of which $2,500,000 have been issued. The Company have paid since 1894 quarterly dividends of 3 per cent. each. The total assets on Jan. 1, 1896, were valued at $7,664,333. The New York and East River Company was incorporated in 1892, and the works they constructed were described in the "Journal" for April 24, 1894 (p. 764). Gas was turned into their tunnel under the East River from Ravenswood, Long Island, to East Seventy-first Street, New York, in October, 1894. Their authorized capital

is $2,000,000 of preferred, and $5,000,000 of common stock; and their bond debt $3,500,000 of first, and $1,500,000 of consolidated mortgage 5 per cent. bonds.

Particulars of another projected consolidation are given in "Progressive Age" for the 2nd inst. The Central Union Gas Company was incorporated on the 14th ult. The capital is stated at $3,500,000; and the incorporators are several men known to be connected with the East River Company. The intention is to carry on operations in New York, Westchester, King's, Queen's, and Richmond counties. As a matter of fact, says our contemporary, the Company was organized for the purpose of acquiring the control of the Central Gas Company, operating in the Harlem districts. It has been known to people conversant with the progress of gas matters in New York, that parties largely interested in one or more of the more important gas undertakings of the city have been quietly absorbing the stock of the Central Gas Company; and it has been rumoured also that the same interest which has, as it now appears, acquired the undertaking of that Company has been in negotiation for the plant and business of the Northern Gas Company, who also operate in the Harlem section. It appears that there has lately been an unusually keen inquiry for the Company's stock, as within the memory of the most experienced dealers no share has ever passed through their offices; and the present demand is therefore regarded as being all the more significant of some development connected with the undertaking. The Central and Northern Companies have free scope in the territory north of the Harlem River; and both have been charging favourable rates for gas to the consumers.

According to the same authority, a scheme is on foot to consolidate all the illuminating gas companies in Pittsburgh, and thus to economize the fixed expenses; all the gas being manufactured at one works. Ground has been bought adjoining the Pittsburgh Gas Company's plant, and 120 bye-products coke-ovens are to be erected thereon. That Company, with a capital stock of $1,320,000 and about 85 miles of pipe; the East End Gas Company, capitalized at $200,000, and having 135 miles of pipe; the Allegheny Gas Company, with $800,000 capital stock and 70 miles of pipe; the Consolidated Gas Company, capitalized at $300,000, and having 15 miles of pipe; and the South Side Gas Company, capitalized at $500,000, and possessing 30 miles of pipe, are said to be part of the proposed consolidation.

A consolidation scheme has been completed in Chicago, and a new Company formed, who will use the charter of the People's Gaslight and Coke Company, and be called the People's Consolidated Gaslight and Coke Company. The stock of this Company will be given in exchange for the trust receipts of the Fidelity Insurance Trust and Safe Deposit Company of Philadelphia, which are now traded in on the Stock Market, and which represent the ownership of the stocks of the several Chicago Gas Companies. It is stated that the new Company will also issue consolidated mortgage 5 per cent. bonds to take up the mortgage indebtedness of the present Companies. The amount of the Fidelity Trust receipts outstanding is $24,837,800, and the Company hold $14,887,625 out of the $14,984,200 of the stocks of the People's Gaslight and Coke, Equitable Gaslight and Fuel, Chicago Gaslight and Coke, and Consumers' Gas Companies. The Company control also, through these stocks, all but $15,800 of the $1,650,000 of stock of four smaller Companies. The combined mortgage indebtedness of all the Gas Companies is $26,846,000.

GAS AS AN ILLUMINANT.

The following article on the above subject appeared in the "Dundee Advertiser" on Monday last week:—

It is popularly supposed that the discovery of coal gas was first made by William Murdoch in 1792, and was practically applied by him for illumination in 1798. Though the latter statement is correct, the former is far from being accurate. Nevertheless it must be owned that the working out of the notion of an illuminating gas distilled from coal and its products is due to two Scotsmen—the famous Lord Dundonald and the humble Ayrshire mechanic, William Murdoch. The origin of this notion must be sought for in a very remote age, and in a distant Eastern land. One of Schopenhauer's favourite theories was that China was the mother of civilization by arts and sciences. The Chinese used the mariner's compass, knew the method of manufacturing gunpowder, and were competent printers and lithographers, centuries before any of these inventions were known in the West of Europe; and to the Chinese also must be ascribed the early discovery of gas lighting. The gas they used, however, was not artificially produced, but was taken direct from the vast laboratory of Nature. In the province of Tsee-Lieou-Tsing, there have existed for ages numerous "fire wells" from which an inflammable gas issues; and the Chinese necromancers in very early times were wont to fill skin-bladders with this gas, and use them for magical purposes. They did exactly the same with them as the English divine, John Clayton, did in 1690. They punctured the skin and lighted the stream of gas which escaped under pressure. Here is the plain origin of portable gas, though it was not applied for illumination. It has been reasonably conjectured that the "perpetual lamps" in the Temples of Vesta, so often referred to by ancient Greek and Roman writers, were simply natural reservoirs of gas, which, when once lighted, could never be extinguished. At the present day this natural gas is used for lighting purposes in Georgia and in the salt mines of Szalina in Hungary. A traveller in China during the close of last century recorded that in some of the mines in Kia-Ting-Tau, a few hundred miles from Canton, the miners used this gas for lighting, heating, and supplying their furnaces. There can be no doubt that these Chinese "fire wells" were identical with the natural gas-jets found in New York State and at Fredonia, near Lake Erie. The gas was evidently carburetted hydrogen (C_2H_4), though in an impure state, and could readily have been purified and distributed for general use.

These reservoirs of natural gas had supplied light and heat for countless ages before it occurred to anyone that it might be possible to manufacture the gas artificially. Fournier relates that in 1841 he found in the Bibliothèque Impériale at Paris a little book which recorded the experiments of the author in making artificial gas. It was published by Jean Tardin in 1618, and anticipated the earliest English experiments of the same kind by at least fifty years. Tardin was a poor doctor at Tournon, in the Department of Indre et Loire. He had made a special study of the "fire well" at Grenoble, and his book was a description of "the burning fountain" there, and an examination of the causes of the phenomenon. He conjectured that the inflammable gas was "exhaled" from the bituminous coal beds in the district, purified by passing through water. His reasoning was very simple and cogent. Looking at a lighted candle, he found that, when heat was applied, the tallow or wax "exhaled" an inflammable gas. Here it is worth noting that Tardin hit upon the recent discovery in illumination known as the Welsbach light, and also suggested the oil-furnace. Applying his argument, he thought it possible, by the application of heat, to make the bitumen exhale its "spirit" (for our word "gas" is simply the Low Dutch *ghoast* = spirit), so that reservoirs might be formed anywhere. He proceeded to experiment. He placed pounded coal in a closed vase, submitted it to heat, and found the anticipated result in a jet of inflammable gas. This wondrous discovery did not attract notice, and Tardin's name is forgotten, though beyond question he was the inventor of illuminating gas.

Fifty years after Tardin's book was published, a similar result was independently attained by Thomas Shirley. In 1667, Shirley published an account of his examination of the burning well at Wigan; and he concluded that the inflammable gas was "distilled" from the coal beds in Lancashire. Twenty years later (1687), Dr. J. B. Denis, of Paris, described a *fontaine curieuse* in Poland, which gave off a gas that flamed *comme fait l'esprit de vin*, and suggested that it might be used for lighting purposes. About the same period (1690), the Rev. John Clayton wrote a letter to the famous *savant*, the Hon. Robert Boyle, in which he detailed his experiments in distilling gas from coal. The letter is now in the British Museum. Clayton employed the same method for distillation as Tardin had done in 1618; and he collected the gas in bladders, as the Chinese did before the beginning of the Christian era. The letter was not published till 1739, when it appeared in the Philosophical Transactions of the Royal Society (Vol. XLI.). Meantime, Dr. Stephen Hales, in his "Vegetable Staticks," published in 1726, suggested that an illuminating gas might be distilled from coal, though he made no practical experiments for that purpose. Clayton's discoveries attracted little notice in this country; but the French scientists proceeded with their experiments independently. In 1764, M. Jars, of the Academy of Sciences, proposed to utilize the gas obtained from the coal in the collieries of the Lyonnais, and to convey it in pipes to a neighbouring village for lighting purposes; but the idea was not adopted, and was discounted by an accidental explosion.

England again took up the advocacy of coal gas as an illuminant in 1765, when Mr. Spedding, the Manager of Lord Lonsdale's coal mines near Whitehaven, carried out the idea so far that he used the gas for lighting his own offices. He offered to form reservoirs from which he would supply the streets of Whitehaven with gas-lamps; but the Magistrates, with customary civic obtuseness, declined the proposal. In August, 1776, M. Chaussier, of Dijon, directed the attention of the Academy of Sciences to the subject; while Professor Minkelers, of Louvain, in 1785 lighted up his lecture-room with coal gas. The first attempt at lighting a public building was made by the German scientist Driller in 1787, when he succeeded in illuminating the Lyceum Theatre, London, with the new light, then known as the *lumière philosophique*. In 1787, Lord Dundonald began experiments with coal tar as a source; and he succeeded so well that he was able to light up his mansion of Culross Abbey, on the Forth, with the gas produced from tar—the first instance of domestic illumination on record. It is curious that Lord Dundonald should have taken one of the waste products of modern gas making as the source of his illuminant.

The real hero of gas lighting, however, was William Murdoch, born at Old Cumnock, Ayrshire, in 1754. While engaged at the mines in Redruth, Cornwall, in 1792, he began his experiments. He distilled coal and other inflammable substances in an iron retort, and conveyed the gas a considerable distance in tinned copper pipes; lighting it at small apertures similar to the modern gas-burners. Four years afterwards (1796), he removed to Old Cumnock, and there exhibited his gaslight to numerous friends. The discovery was not publicly announced till the following year; and in 1798, when in the employ of the famous James Watt, he lighted up the Soho Foundry, Birmingham, which belonged to Messrs. Boulton and Watt. Murdoch's method of manufacturing gas was not described in detail till 1808. Before that time, F. P. Lebon, of Paris, had perfected his plan of extracting gas from coal and also from wood, and obtained protection in 1799 for his invention. He died shortly afterwards, and an Englishman—F. A. Winsor—who had seen Lebon's process in Paris, plagiarized the system, and introduced it to London. He lighted the Lyceum Theatre with gas for the second time in 1803, and was regarded by the Londoners as the original inventor. The first Gas Company was founded in 1810, and was authorized by Act of Parliament. Westminster Bridge was lighted with gas in 1813, and within a few years gas was introduced generally to the houses of London. Though Murdoch was not its discoverer, he was the first to make the application of coal gas possible as an illuminant.

ELECTRIC LIGHTING NOTES.

The Gas Committee of the Keighley Corporation recommend the Council to empower them to insert such provisions in the Bill to be promoted next session as the Town Clerk may think advisable to enable them to produce and supply electricity for the widest possible variety of purposes.

The Darwen Town Council have approved of an electric lighting scheme which will cost nearly £16,000 to carry out—in fact Mr. E. M. Lacey, the Consulting Electrical Engineer of the Blackburn Corporation, who was called in, estimates the cost at £15,645. The direct driving system will be adopted.

Last Wednesday evening, about eight o'clock, a short circuit occurred between some high pressure cables at the electricity generating station of the Wolverhampton Corporation, the effect of which was to throw out of action both of the dynamos then running. The street-lamps were extinguished for half an hour. The private and shop lighting was only partially affected, the illuminant being dull for about thirty minutes.

The Devonport Town Council formally appointed a Committee on Thursday to exercise the powers conferred by the Devonport Electric

Lighting Order. The Town Clerk (Mr. J. Pilling) explained that the powers obtained by the Corporation would expire in July next, and if they had not then been exercised the Board of Trade might revoke the Order, and confer the whole of the privileges now possessed by the Council on a private company.

Penzance is among the most recent of the towns to be bitten by the electric light craze. At a meeting of the Town Council last week, the Lighting Committee presented a report which indicated the intention to apply for a Provisional Order next session. The carrying out of the scheme appears, however, to depend upon the success of another project which is under consideration, the object of which is to extend the area of the borough so as to include certain suburban districts. Mr. J. Trenwith, who brought up the Committee's report, said he trusted that when this extension was accomplished the Corporation would be able to supply the town with electric light. He added that the matter came before the Committee seven years ago—which is evidence, at all events, that things do not progress very rapidly in West Cornwall; and he concluded with the expression of the hope that before another seven years they would have the lighting of the town in their own hands. Judging by the past, this is almost too sanguine a forecast.

The Bridgwater Town Council, as our readers may be aware, have in hand an electric lighting project, upon which the Lighting Committee have presented a long report. This document came up for confirmation at the last meeting, in conjunction with the general minutes; but it did not pass unquestioned. Mr. Whitby raised the question whether or not the report should be sent back to the Committee for the consideration of certain figures contained in it, the correctness of which had been challenged. The Committee had, he said, based their illustrations of the comparative cost of gas and the electric light on the assumption that 5 cubic feet of gas would yield a light of only 8-candle power. He took it that it was important the Council should not have misleading figures before them, and he asked whether the Committee were able to explain and justify their figures, or whether it would not be better to refer the matter back to them for further consideration. He thought it was only right that they should have an opportunity of publicly putting right anything that might be wrong. The Chairman of the Committee (Alderman Peace) said of course there was a question as to what basis they should work upon with regard to the lighting power of the gas supplied; and there was a difference of opinion as to what light they would get from a gas-burner that had been probably in existence for some years. That they got 14 or 16 candle power from the burner, he, as Chairman of the Lighting Committee, certainly denied. But whether, in their report, the Committee were quite justified in comparing it with an 8-candle power electric lamp was entirely a matter of opinion. Probably they had lost sight of the fact that there was some difference; and they would probably not have taken this basis had it occurred to them at the time of preparing the report. It was also a question whether the electric light could be obtained for the price the Committee gave in the report. As far as they were concerned, if it was thought fit by the Council to refer the report back, they would be very pleased to consider it, but he did not quite see what was to be gained by doing so. Mr. Good remarked that in the report the Committee had been comparing 8-candle electric power against 16-candle gas power; so that, from the figures given, they would have half the lighting power by electricity that they had from gas. He had gone into the figures, and he took it that they would not be able to supply electricity at less than 6d. per Board of Trade unit, and this would be something like a charge on the rates of at least double the cost of gas, or even more. Looking at the matter from this point of view, he had much pleasure in seconding the suggestion of Mr. Whitby to refer the report back. Alderman Manchip remarked that he was certainly in favour of the report being referred back in order that the figures might be verified. There was unquestionably a difference in calculation somewhere. They knew that the report had been carefully prepared; but inasmuch as some little error seemed to have unintentionally crept in, he thought it would be well to refer it back. The Town Clerk said if this were done, the report could not be confirmed until the next meeting. Mr. Good asked if delaying obtaining their Provisional Order would make any difference. The Town Clerk replied that probably some other people would get it before them. Mr. Good remarked that, if it was not going to be a profitable business, he did not see why they might not have it. After some further conversation, a suggestion was put forward that the Council should proceed with their application for the Order and also refer the report back. Mr. Whitby expressed his willingness to accept this suggestion. The Town Clerk pointed out that this would mean rescinding the resolution adopting the whole scheme. Alderman Foster was anxious to know if the ratepayers would be consulted upon the question. He said there had been a lot of talk going on in the town, and not a little agitation on the electric lighting question; and he thought that, in a scheme involving the expenditure of £15,000 to £20,000, the ratepayers ought to be consulted. Alderman Peace said he declined to be "drawn" upon this matter. The Town Clerk remarked that when the scheme was all ready, the Lighting Committee would, of course, be prepared to take the necessary steps. If it was necessary to consult the ratepayers, this would be done. The discussion then dropped, and the minutes were confirmed.

The Liability for Injury to Gas and Water Pipes by Electrolysis.—According to a statement which recently appeared in a New Jersey paper, the gas and water companies in that city have been put to great expense, and subjected to considerable loss, in replacing pipes destroyed by the trolley electric currents. It appears that the people who control the trolleys are interested in the water and gas undertakings; so that there has been no litigation over the damage done. The responsibility of the trolley owners for pipes destroyed by their currents bids fair to be judicially determined. The water-pipe leading from the street main to the new building known as the Odd Fellows Hall was found pitted through electrolysis to such a degree that another service was necessary. One of the Lodge Trustees stated that they intended to send in the bill for the new service-pipe, and the cost of putting it in, to the Trolley Company; and if payment was refused, it was intended to institute a suit to ascertain if these companies could destroy private property without paying compensation for it.

DISTRICT COUNCILS AND THE SUPPLY OF WATER TO ESTATES.

Early in the session of 1896, a Bill was introduced into the House of Commons by Colonel Cotton-Jodrell, Sir J. Brunner, and Mr. Tollemache, to give greater facilities to District Councils to arrange with landowners to charge their estates for the purpose of assisting in the provision of a supply of pure water thereto. It was pointed out, in a Memorandum attached to the Bill, that at the time limited owners and their powers come under the Reservoirs Act, 1877, by which they can carry out the supply of water by going to land improvement companies, spending their own money, or borrowing it; the sanction of the Board of Agriculture having to be obtained thereto. The Bill provided that all owners, limited or otherwise, might make arrangements with Rural District Councils with the concurrence of the Board. In rural parishes, it often occurs that a long extension of water-main cannot be provided without the assistance of the owner, as the rate for carrying out the work would be too heavy a burden for the townships or parishes concerned; and the advantage claimed for the Bill was that it empowered all owners to charge their estates or provide money for this purpose. Under it, where a long extension of main was contemplated, all owners, large or small, could combine to supply the need; whereas under the Reservoirs Act each individual owner could only act for his own estate. In the case of "partial action"—*i.e.*, where only part of a parish or township had to be supplied—the non-receiver of the water would object to the special rate. The Bill did away with this difficulty. As an example of its effect in a Union where its principles had already been applied by mutual arrangement and by the zeal of the Surveyor, it was stated that about 120 miles of main had been put down, supplying some 3000 houses, which could not otherwise have been so treated; and applications for the water were still coming in from owners and occupiers all round. The Bill did not pass, and therefore it was re-introduced last session—this time with more success, as the measure received the Royal Assent on the day Parliament was prorogued. The text of the Act is as follows:—

1.—Where any person who is a landowner within the meaning of the Improvement of Land Act, 1864 (in this Act referred to as the principal Act), contributes any money towards the expenses incurred by a District Council for the purpose of supplying water to any lands of such landowner, whether together with other lands or not, the amount so contributed may, with the sanction of the Board of Agriculture given under this Act, be charged on the land of the landowner so supplied with water, in the same manner, as nearly as may be, and with the like effect, as in the case of a charge under the principal Act.

2.—Where the landowner and the District Council agree that the contribution shall be payable by half-yearly instalments, the charge under this Act may be granted in favour of the District Council, to secure the payment to them of such contribution; and the sums payable in respect of the charge shall be in addition to any sums which may be payable for the water supply by way of water-rate or water-rent.

3.—A charge under this Act shall not be made for any term exceeding 25 years.

4.—When the supply of water to the lands of the landowner will be beneficial to persons residing or engaged in labour on such lands, the Board may, if they think fit, sanction the charge, although it may not be shown that the supply of the water will effect a direct yearly increase in the value of the lands, or be productive of a yearly revenue to the owner of the lands exceeding the yearly amount proposed to be charged thereon.

5.—Where the annual sum to be made payable under a charge proposed to be granted by virtue of this Act in respect of the supply of water to any house or houses does not exceed the amount payable at the date of the charge for such water supply by way of water-rate or water-rent, the Board of Agriculture may execute the charge upon such information as they think fit to require; and in such case the requirements of the principal Act with respect to matters and proceedings previous to the execution of a charge shall not apply.

6.—This Act shall not extend to Scotland or Ireland.

7.—This Act may be cited as the District Councils (Water Supply Facilities) Act, 1897, and shall be read with the Improvement of Land Act, 1864.

Bolton Gas-Workers and their Wages.—At a meeting of the Gas Committee of the Bolton Town Council on Friday, a letter was read from the Bolton Branch of the Gas Workers' Union as to wages paid to the men employed at the gas-works. It was resolved that the men should be paid time-and-a-half for the three Sunday shifts; and that those engaged in sulphate making should be advanced from 3s. 8d. to 4s. a day; the 3s. 8d. rate to obtain when the men are engaged in any other class of work. An application on the part of the enginemen for eight-hour shifts was not acceded to.

Incandescent Gas Lighting in Manchester Streets.—The lighting of Mosley Street, Manchester, and some of the adjoining thoroughfares, with incandescent gas-burners has proved so satisfactory, that it has been decided to place similar burners in the street-lamps in Market Street, Piccadilly, portions of London Road, Oxford Street, Portland Street, Oldham Street, and Deansgate. The anti-vibration arrangement has been found so effectual in preserving the mantles, that the cost of this system of street-lighting is only about the same as that by ordinary burners, with, of course, greater illuminating power.

The Proposed Auxiliary Gas-Works for Coventry.—The Gas Committee of the Coventry Corporation have had under consideration for some months the question of providing auxiliary gas-works for the city. It may be remembered that in May last, as noticed in the "JOURNAL" at the time, a report was presented to the City Council in which the duplication of the water-gas plant was recommended, and reference was made to a scheme for additional works, which it was stated would be brought forward in September. The matter was mentioned at the last meeting of the Council, in connection with a recommendation of the Gas Committee to purchase a small house in Gas Street. The Chairman (Alderman Andrews) reminded the Council that the policy of the Committee was not to increase the production at the present works, but to erect new ones. It appears that the details of the scheme will be made known next month, as promised.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The last in point of time, there have been issued this week the annual accounts of the Aberdeen Corporation Gas Department. I have only as yet seen a newspaper summary, but expect to have a more complete account next week. Gas and meter rents produced £71,441; residual products, £9022; and £359 was derived from the gas-stove department. On the expenditure side, manufacture of gas cost £51,207; distribution, £1870; rents, rates, and taxes, £4726; management, £2004; and discount and bad debts, £2786. For depreciation, a sum of £4920 has been set aside. Various other charges are provided for; and a balance is brought out of £2 17s. 4d. From the preceding year, a balance of £3651 5s. 7d. was brought forward, which makes the net balance at the credit of profit and loss account £3654. A feature of the accounts this year, and one which is suggestive to other bodies similarly situated, is the result of a revaluation of the property of the undertaking, made during the year. The valuation stood in the books of the Corporation at £151,687, which was arrived at in this way—the capital expenditure, including the value when the Corporation acquired the undertaking in 1871, amounted to £297,654; and there has been written off for depreciation £145,966. These are book-keeping values. But on the application of a skilled mind to the actual value of the material *in situ*, it is found that the additions to the works, plant, and buildings have far outrun the Treasurer's estimates; and the present valuation is £270,177. That is to say the works have appreciated to the modest amount of £118,490. The owners of other works might well note the result. I do not know what the effect may be in the matter of assessment, although from the method (which I consider to be anything but efficient or just) of fixing the valuation for assessment purposes upon the free annual revenue, I incline to the belief that it will be nothing. But the effect upon the mind of the community should be great, as the new valuation brings out very clearly what a valuable asset they possess in the gas undertaking. The depreciation allowed for is at the rate of 3½ per cent. One result of the revaluation might be, if it is given effect to in the books, that the sum set aside for depreciation, being on the larger value, should now be greater than before. This would mean that in less than twenty years the depreciation allowed would wipe out the whole of the present book value of £151,000. The Auditor would thus be satisfied; and thereafter the undertaking—barring any new outlays which might be made in the interval—would be without other debt than the annuities. Therefore the revaluation will, if the book entry is altered, lead to the Corporation continuing to allow for depreciation for about ten years longer than they would have done under the old valuation. But there is no necessity to alter the book entry, unless in a way that suggests itself to me, which would be novel, and which might be attended with some difficulty. This is to write off the amount of the appreciation, and thus reduce the actual amount to be depreciated to £33,197. This sum could be wiped off in seven years. The question is one for the Treasurer's Committee. To my mind, the right way would be to keep this new valuation in the locker, and to go on depreciating as heretofore; leaving any surplus earnings free for the reduction in the price of gas or the redemption of annuities. I am glad to see that the Gas Committee have this year taken the course of recommending a reduction in the price of gas from 3s. 4d. to 3s. 2d. per 1000 cubic feet. Like some others that we know of, the Committee here have framed their estimates to show a less return than the outlay, in order, apparently, to work off the surplus in hand. The estimated expenditure for the current year is £79,450; and the estimated revenue, £79,325. But when the balance of £3654 is added to the revenue, the total amount is raised to £82,979, which makes the estimated surplus £3529. It is, of course, quite possible that the revenue may come out greater than the expenditure; for the Corporation have been able to buy their coal on very favourable terms, and there is also to be taken into account that at present plant is being fitted up in the works for the recovery of cyanide—the second in Scotland—from which a return may be derived. I say *may*, because at present the market for cyanide is not particularly flourishing. But time works wonders, and in nothing more so than in marketing. It is noteworthy that the price of gas has been reduced by as much as 9d. per 1000 cubic feet within the past five or six years.

The Gas and Electric Lighting Committee met on Wednesday; and besides the accounts and estimates, they also considered, along with a Sub-Committee of the Harbour Board, a proposal to light the quays in Aberdeen by electricity. On the recommendation of the Electrical Engineer, it was resolved to provide current for the lighting at the usual rates to large consumers, but in the event of the consumption being 80,000 units or over, to give the Harbour Trustees a special rebate of 12½ per cent. The cost for electricity will be a good deal greater than the charge for gas at present; but the expectation is that the quays will be much better lighted. This, of course, will depend on the number of lamps employed; and the thought arises that if the same outlay were made upon gas as is proposed upon electricity, the lighting would probably be much better than electricity is expected to make it.

Being on holiday, I have not had an opportunity of seeing the "JOURNAL" this week; and I do not recollect how I put the figures for the Greenock Corporation Gas Department. But I am advised from Greenock that the estimated revenue is £40,120; and the estimated expenditure, £31,820—leaving a gross profit of £8300. Out of this sum, there falls to be provided: For the sinking fund, £4000; for interest, £2700; and for extraordinary expenditure, £1275 11s. 8d.—leaving a net surplus of £324. The gross surplus last year was £8418. Coal, under the new contracts, will cost a little more than last year; and residuals are estimated to produce less. But notwithstanding these adverse circumstances, it is anticipated that a profit will be made; and the price of gas has been retained at the figure it has been sold at during the past two years—viz., 3s. per 1000 cubic feet, and not 3s. 1½d. which I was misled into giving last week. When it is considered how very severely the industries of Greenock have suffered from the decline of sugar refining, it is satisfactory to find that the Gas Department, under the management of Mr. S. Stewart, is still flourishing.

The Police Commissioners of Portsoy have resolved to adopt the Burghs Gas Supply Act of 1876, with a view to the acquisition of the local gas undertaking. The works are now the property of Mr. Adam L. Gillan.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST (see ante, p. 473).

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	9 Apl.	10½	Alliance & Dublin 10 p. c.	24—25	..	4 4 0
100,000	10	,,	7½	Do. 7 p. c.	17—18	..	4 3 4
300,000	100	1 July	5	Australian (Sydney) 5 % Deb.	106—108	..	4 12 8
200,000	10	27 May	7	Belgrano (B. Ayres), Limited	9¾—10	..	7 0 0
100,000	Stck.	29 June	5	Do. 5 p. c. Deb. Stk	103—106	..	4 14 4
200,000	5	27 May	6½	Bombay, Limited	6¾—7¼	..	4 9 7
40,000	5	,,	6¼	Do. New, £4 paid	5¼—5¾	..	4 10 7
380,000	Stck.	27 Aug.	12	Brentford Consolidated	297—302*	+3	3 19 5
240,000	,,	,,	9	Do. New	220—225*	+1½	4 0 0
50,000	,,	,,	5	Do. 5 p. c. Pref.	145—150*	+2½	3 6 8
159,375	,,	11 June	4	Do. 4 p. c. Deb. Stock.	135—139	..	2 17 6
220,000	Stck.	26 Mar.	11½	Brighton & Hove Original	273—278	..	4 2 8
208,820	,,	,,	8½	Do. A Ord. Stk.	201—206	..	4 2 6
933,500	Stck.	27 Aug.	5	Bristol, 5 p.c. max.	130—135*	+2½	3 14 1
420,000	20	26 Mar.	11½	British	56—57	..	3 18 11
50,000	10	27 Aug.	11½	Bromley, Ordinary 10 p. c.	23—25*	+1	4 12 0
71,000	10	,,	8½	Do. 7 p. c.	18—20*	+1	4 5 0
500,000	10	28 Apl.	6	Buenos Ayres (New) Limited	10½—11½	..	5 4 4
200,000	100	1 July	6	Do. 6 p. c. Deb.	—	..	—
150,000	20	15 July	8½	Cagliari, Limited	30—32	..	5 3 1
100,000	10	11 June	8	Cape Town & District, Ltd	16¾—17¾	..	4 11 8
50,000	50	3 May	6	Do. 6 p. c. 1st Mort.	58½—59½	..	5 0 10
550,000	Stck.	9 Apl.	13½	Commercial Old Stock	343—348	..	3 17 6
165,000	,,	,,	10½	Do. New do.	257—262	..	4 0 1
165,000	,,	11 June	4½	Do. 4½ p. c. Deb. do.	155—158	..	2 16 11
800,000	Stck.	11 June	13	Continental Union, Limited.	255—260	..	5 0 0
200,000	,,	,,	10	Do. 7 p. c. Pref.	215—220	+2	4 10 11
51,600	Stck.	27 Aug.	14	Croydon Com'cial A 10 p. c.	315—320*	+5	4 7 6
163,400	,,	,,	11	Do. B 7 p. c.	252—257*	+2½	4 5 7
535,000	Stck.	12 Aug.	5½	Crystal Palace Ord. 5 p. c. Stk	137—140	..	3 15 0
60,000	,,	,,	5	Do. 5 p. c. Pref.	140—143	..	3 9 11
486,090	10	29 July	11	European, Limited	24½—25½	..	4 6 3
354,060	10	,,	11	Do. £7 10s. paid	17½—18½	..	4 9 3
5,896,590	Stck.	12 Aug.	12¾	Gaslight & Coke, A, Ordinary	317—320	+5	3 19 8
100,000	,,	,,	4	Do. B, 4 p. c. max.	113—118	..	3 7 10
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	315—320	..	3 2 6
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	150—155	..	3 4 6
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	220—225	..	3 6 8
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	202—207	..	3 7 8
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	315—320	..	3 2 6
476,000	,,	,,	6	Do. K, 6 p. c. Prf.	180—185	..	3 4 10
1,061,150	,,	11 June	4	Do. 4 p. c. Deb. Stk.,	138—141	..	2 16 9
294,850	,,	,,	4½	Do. 4½ p. c. do.	155—158	..	2 16 11
908,000	,,	,,	6	Do. 6 p. c. do.	207—212	..	2 16 7
70,000	10	13 May	6	Hongkong & China, Limited	13½—14½	..	4 2 9
3,800,000	Stck.	13 May	10	Imperial Continental	217—222	+4	4 10 2
376,400	100	3 Aug.	4	Do. 4 p. c. Debs. Red.	99—102	..	3 18 5
473,600	Stck.	12 Aug.	3½	Do. 3½ p. c. Deb. Stk ,,	104—107	+1	3 5 5
75,000	5	29 June	6	Malta & Mediterranean, Ltd.	5½—6	..	5 0 0
560,000	100	1 Apl.	5	Met. of Melbourne, 5p. c. Deb.	112—114	..	4 7 8
250,000	100	,,	4½	Do. 4½ p. c. Debs.	108—110	..	4 1 10
541,920	20	11 June	5	Monte Video, Limited	15—16	..	6 5 0
150,000	5	27 May	8	Oriental, Limited	8¼—8¾	..	4 11 5
135,000	5	,,	8	Do. New, £4 10s. paid	7½—7¾	..	4 12 10
15,000	5	,,	8	Do. do. 1879, £1 paid	1¼—2	..	4 0 0
60,000	5	26 Mar.	7	Ottoman, Limited	4¾—5¼	..	6 13 4
420,000	100	3 May	6	People's Gas } 1st Mtg. Bds.	104—109	..	5 10 1
500,000	100	1 June	6	of Chicago } 2nd Do.	105—110	..	5 9 1
250,000	10	27 May	10	San Paulo, Limited	14½—15½	..	6 9 0
5,475,000	Stck.	12 Aug.	5½	South Metrop., 4 p.c. Ord.	145—148	..	3 10 11
1,416,667	,,	15 July	3	Do. 3 p.c. Deb. Stk.	105—109	..	2 15 0
60,000	Stck.	12 Mar.	12†	Tottenham & Edmonton, A	275—285	..	4 4 2
60,000	,,	,,	9†	Do. B	190—200	..	4 5 0
182,380	10	27 May	10	Tuscan, Limited.	13¾—14¾	..	6 18 0
149,900	10	1 July	5	Do. 5 p.c. Debs. Red.	100—103	..	4 17 1
				WATER COMPANIES.			
746,159	Stck.	29 June	10½	Chelsea, Ordinary	335—339	..	3 1 10
150,000	,,	,,	5	Do. 5 p. c. Pref.	177—180	..	2 15 6
160,000	,,	,,	4½	Do. 4½ p. c. Pref. Stk., 1875	157—160	..	2 16 3
175,785	,,	26 Mar.	4½	Do. 4½ p. c. Deb. Stock	160—165	..	2 14 6
1,720,560	Stck.	9 Apl.	7	East London, Ordinary	224—228	..	3 1 4
554,740	,,	29 June	4½	Do. 4½ p. c. Deb. Stk.	163—166	..	2 14 3
390,000	,,	,,	3	Do. 3 p. c. Deb. Stk.	106½—107½	..	2 15 10
700,000	50	11 June	7½	Grand Junction, 10 p.c. max.	120—125	..	3 0 0
295,000	Stck.	26 Mar.	4	Do. 4 p. c. Deb. Stk.	148—153	..	2 12 4
708,000	Stck.	12 Aug.	13	Kent	350—355	+2	3 13 3
160,000	,,	,,	7	Do. New, 7 p. c. max.	210—215	..	3 5 1
1,043,800	100	29 June	9½	Lambeth, 10 p. c. max.	288—293	+1	3 6 6
406,200	100	,,	7½	Do. 7½ p. c. max.	220—225	+3	3 6 8
350,000	Stck.	26 Mar.	4	Do. 4 p. c. Deb. Stk.	147—150	..	2 13 4
500,000	100	12 Aug.	13	New River, New Shares.	437—442	+2	2 18 9
1,000,000	Stck.	29 July	4	Do. 4 p. c. Deb. Stk.	151—154	..	2 11 11
902,300	Stck.	29 June	5	S'thwk & V'xhall, Ordinary	160—163	..	3 1 3
126,500	100	,,	5	Do. Do. 7½ p. c. Max.	151—154	..	3 4 11
489,200	Stck.	,,	5	Do. Do. 5 p. c. Pref.	173—178	..	2 16 2
1,019,585	,,	9 Apl.	4	Do. 4 p. c. A Deb. Stk.	145—148	..	2 14 2
1,155,066	Stck.	11 June	10	West Middlesex	313—318	+1	3 2 10
200,000	,,	,,	4½	Do. 4½ p. c. Deb. Stk.	163—166	..	2 14 3

† Next dividend will be at this rate. *Ex div.

He proposes to sell them; and I understand they were all but disposed of privately, but that the Police Commissioners, having expressed a wish to acquire them, the transaction did not go on. Mr. Gillan has undertaken to carry on the works till after the November election, in order that the formalities required by the statute may be complied with. The undertaking is a very small one; and the purchase price should be less than £1000. If the ratepayers homologate the transaction, the transfer will be the first one in Banffshire.

There is a proposal to introduce electric lighting jointly into Port Glasgow, Greenock, and Gourock; and a Joint Committee has been proposed, with power to visit any of the towns in Scotland where an electric light installation has been provided, and to employ an electrical engineer to visit the three burghs and advise as to the best means of utilizing the motive powers available for generating a supply of electricity, &c. In Greenock this week, at a meeting of the Finance Committee, and after prolonged discussion, it was agreed to remit the whole matter back to the Sub-Committee to report as to what towns, having control of the gas-works, have an electric light installation also; what is the relative cost of gas and electric light; what amount the Sub-Committee propose to spend on visits to other towns, the Engineer's report, &c.; and how they propose to allocate the cost.

The Police Commissioners of Motherwell possess a Provisional Order which empowers them to supply electricity within the burgh; but the time allowed for its exercise has nearly expired. A private electric lighting Company have generously offered to purchase the town's Provisional Order, and to lay down an installation, at the same time guaranteeing to give the town street lighting, &c., at a price nearly the same as the present cost of gas; the Commissioners to have the option of taking over the works after ten years. This offer appears to have been considered to be too good to be relied upon, for this week the Police Commissioners, in committee, considered the whole question, and unanimously decided to decline the offer of the Company, and to go on with a scheme of their own; the Committee to visit several installations in different parts of the country before deciding on a particular scheme.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Aug.* 28.

Sulphate of Ammonia.—The improved demand last reported has continued; and as makers who were in possession of stocks have not hesitated to seize the opportunity afforded them of unloading, a good business has again been transacted during the past week. In the sensitive condition of the market, this better state of things has been reflected in prices, and a further impulse has been given to values; quotations being £7 12s. 6d. to £7 15s. f.o.b. Leith, £7 11s. 3d. to £7 12s. 6d. f.o.b. Hull, and £7 12s. 6d. to £7 13s. 9d. f.o.b. Liverpool.

The despondency which has so long ruled in the market has been displaced by a more hopeful tone; and the outlook for the immediate future would seem to be distinctly better. At the same time, it is well not to be over sanguine, as it is still a matter of uncertainty how far the demand, which has been directed almost exclusively to parcels for immediate delivery, has been due to the requirements of dealers who had to cover previous engagements for the current month. In this connection, it is noticeable that Leith has been the chief centre of activity, where prompt parcels at this time of the year are more readily obtainable, and where the improvement in values has accordingly been most marked. For forward delivery, the position has given rise to more inquiry, especially for the spring months. Buyers are willing to concede spot values; but makers generally do not care to contract engagements ahead. £7 10s., Beckton terms, is, however, reported done for delivery up to the end of the year.

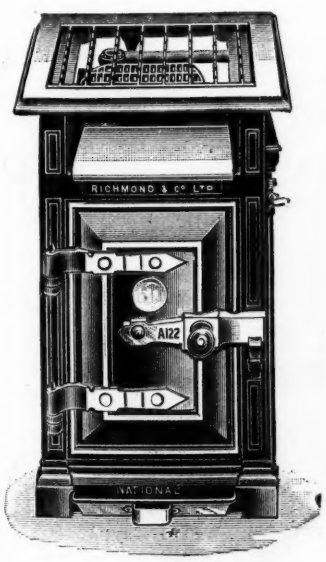
Nitrate of Soda.—On spot quiet, but steady, without change in value. There has been rather more business done in cargoes at 7s. 4½d. to 7s. 7½d. per cwt. for late shipment.

LONDON, *Aug.* 28.

Tar Products.—Business has assumed a holiday and languid character. The collapse of tar products is now making itself felt in the value of tar; several important contracts being let between the margins mentioned below. Benzol shows a featureless position; and buyers are looking forward to lower prices. This is not likely to happen at present, though it is difficult to forecast the future. Anthracene is quoted lower; but these prices are those of dealers, and not of manufacturers, and really represent no actual business. Tar oils are weaker; the demand having slackened off. There is a little better feeling in regard to toluol; but it is not easy to get the market price for it. Carbolic acid is moving slowly, with a tendency downward. Pitch, if anything, is in better favour as the shipping season advances. But no important contracts for quantities are reported; manufacturers believing that the advent of cooler weather and shipping facilities will much improve the position and prospects of this article. Average market values are: Tar, 17s. to 21s. Pitch, 17s. 6d. to 21s. Benzol, 90's, 1s. 11d.; 50's, 2s. Toluol, 2s. 4½d. Solvent naphtha, 1s. 7d. Crude, 30 per cent., naphtha, 11d. Creosote, 2d.; liquid, 2½d. Heavy oils, 42s. 6d. Carbolic acid, 60's, 1s. 11d. Naphthalene, 40s.; salts, 20s. Anthracene, "A" quality, 5½d.; "B" quality, 4½d.

Sulphate of Ammonia continues to show improvement; and there is a more hopeful prospect for the immediate future. The diversity of its outlets is an encouraging feature in this market. There has never been a wider or more extended sphere in this way than is now shown by shipments. Accumulated stocks of years have disappeared, or are disappearing. The market is firm both for spot and forward delivery. As much as £7 12s. 6d., less 3½ per cent., has been paid; and makers are holding for yet higher prices.

Letter-Boxes on Public Lamps.—The Brighouse Town Council have given permission to the local Postmaster to affix letter-boxes to certain of the public lamps.



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COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The only noticeable feature in connection with the coal trade of this district is that the stoppage of so many works in the neighbourhood, as a result of the engineering trades lock-out and strike, is making itself more and more felt, so far as requirements for steam, forge, and general manufacturing purposes are concerned; and the lower qualities of round coal are becoming difficult to move, with stocks accumulating. Prices, however, are without quotable change; but low figures are taken to clear off surplus lots. A steadier tone may, of course, be brought about as soon as the increased demand for house coals comes upon the market. But at present there is no appreciable improvement in this direction; and house-coal collieries are not working more than four days. Engine fuel moves off fairly well. But the restricted supplies of slack are proving ample for requirements; and in these stocks at some pits are being put down. Quoted prices remain unchanged. At the pit mouth, best Wigan Arley averages 9s. 6d. to 10s. per ton; Pemberton four-feet and seconds Arley, 8s. to 8s. 6d.; common house coal, 6s. 6d. to 7s.; steam and forge coal, 6s.; engine fuel, 3s. to 3s. 6d. for common slack, 3s. 9d. to 4s. 3d. for medium, and 4s. 6d. to 4s. 9d. for best qualities. The shipping trade has not been quite so active; but 7s. 6d. to 7s. 9d. is still being obtained for steam coal delivered at the ports on the Mersey.

Northern Coal Trade.—There has been an improved demand in the Durham coal trade of late; but in that of Northumberland, the tone of the market is slightly easier. Best steam coals are quoted from 8s. 9d. to 8s. 10½d. per ton f.o.b.; second class steam coals, 8s. to 8s. 3d.; and steam smalls, 3s. 6d. to 3s. 9d. There is at present a large export demand for these kinds of fuel. On the other hand, there is a large and growing demand for gas coals. Heavy shipments continue to be sent to the Baltic ports, and the local consumption now increases week by week. Some of the large producers of gas coals seem to anticipate a heavy demand this year; and thus the prices, if very irregular, are higher. Generally the quotation is from 7s. 6d. to 8s. per ton f.o.b.; but two large coalowners ask 6d. per ton above the highest of these figures. There is little alteration in manufacturing coals; but the strike of the engineers is at last reducing the consumption of this kind of fuel. Gas coke is in a little larger production; but the price has not varied. The exports from some places show a gratifying increase; coke being more in demand on the Continent.

Scotch Coal Trade.—There is no abatement of activity in the coal trade. So far the engineering dispute has not affected it. Hitherto there has been a good outlet for all the output, with the result that prices keep firm. The rates quoted are: Main, 6s. 9d. to 7s. per ton f.o.b. Glasgow; ell, 7s. to 7s. 6d.; splint, 7s. to 7s. 3d. The shipments for the week amounted to 175,426 tons—a decrease of 17,706 tons on the preceding week, and of 15,226 tons on the corresponding week of last year. For the year to date, the total shipments have amounted to 5,012,690 tons—an increase over the corresponding period of last year of 174,704 tons.

A Water Supply Scheme for Rural Farnham.—A company is being formed for the purpose of carrying out a water undertaking for the Farnham Rural District, or such portion of it as is not comprised in the area of an existing Company. We understand that the Farnham Rural District Council have approved of the scheme and given the necessary permission for the opening of roads, so that the work may be commenced at once. The Council have also resolved to support the new Company in their application for statutory powers next session of Parliament. Mr. A. C. Pain, M.Inst.C.E., is organizing the new undertaking.

Extensions at the Chorley Gas-Works.—At last Thursday's meeting of the Chorley Town Council, it was resolved to make application to the Local Government Board for sanction to borrow £8000 for the erection of a gasholder with a capacity of 700,000 cubic feet. Mr. Kirkman, in referring to the finances of the Gas Department, said the past half year had been the best they had had. The manufacture of gas had cost them less by £508 than in the corresponding period of 1896; and there had been saving in other ways. They stood in an improved position to the extent of £1030; and this justified them in improving the works.

Sales of Shares.—On Monday evening last week, Mr. F. J. Hall offered for sale by public auction in Durham a number of shares in the Hartlepool Gas and Water Company and the Consett Water Company. Ten fully-paid £5 "A" shares in the first-named Company, on which 10 per cent. is being paid, were sold at £14 7s. 6d. each; nine fully-paid £5 "C" shares (7 per cent.) at £10 1s. 3d.; and six fully-paid £10 "D" shares at £20 apiece. The next lot consisted of six fully-paid £25 ordinary shares in the Weardale and Shildon District Water Company; and they were knocked down at £39 15s. each. At Preston, on Wednesday, Messrs. T. Dewhurst and Son offered for sale three lots of shares in the Hartlepool Gas and Water Company. The first lot included 51 £5 fully-paid "B" shares; and they sold for £10 12s. 6d. each. The second lot, consisting of 50 £5 fully-paid "C" shares, fetched from £10 to £10 4s. per share; and the third, £10 "D" shares, which sold for £20 each.

Ottawa Gas Company.—The accounts of this Company, of which Mr. John Coates, M.Inst.C.E., is President, for the year ending March 31, which were presented at the recent annual meeting, showed that the profit was $28,043, compared with $26,140 in the preceding twelve months; being an increase of $1903. After deducting the interest on bonds, $4866, there was a net profit of $23,177 available for distribution; and the Directors recommended a dividend of 7 per cent. The business in the year was regarded as satisfactory, considering the reduction in the consumption of gas in the Dominion Government Buildings, also in the price of fuel gas, and the increased price of oil, which is 25 per cent. higher than when oil gas manufacture was commenced. The Directors have in contemplation the use of bituminous coal for producing a portion of their gas. If this project is carried out, they estimate that the cost of manufacture will be decreased, and at the same time a stand-by will be provided in case of trouble arising with the oil contractors. During the year covered by the accounts, 217 meters were added; making a total of 798 for lighting and 632 for fuel gas.

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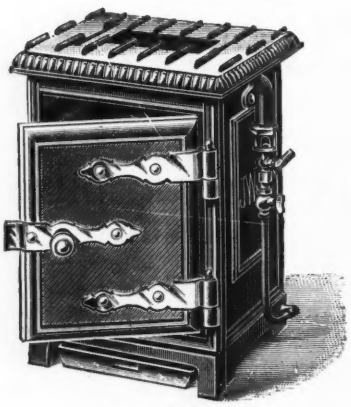

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Sale of a Liquidated Electric Light Company's Plant.—Last Tuesday the electric light installation laid down for the supply of Thetford—consisting of a valuable freehold site, with complete modern plant, mains, &c.—was sold by auction, consequent on the Company owning it being in liquidation. Bids for the property started at £800, and advanced to £1375, when it was knocked down to Messrs. Laurence, Scott, & Co., of Norwich. In referring to the sale, a local paper says: "Compared with the recent offer of the Gas Company to sell their plant to the Urban District Council for £5500, the purchase is considered a good bargain, as the electric works are of recent erection and in very excellent condition, and there is plenty of scope for its further extension in the town."

Austrian Incandescent Share Companies.—The report of the Managers of the Austrian Incandescent Share Company, Limited, for the period from Sept. 26, 1896, to Aug. 18, 1897, shows a divisible credit balance of £75,724, out of which they recommend the payment of a dividend of 4s. 7d. per share, free of income-tax, carrying forward £2391. The profit shown in the balance-sheet is derived from the dividend paid to the Company by the Oesterreichische Gasglühlicht Actiengesellschaft of Vienna. The accounts of that Company show a net profit of 2,299,508·86fl., after writing off considerable amounts. The reserve fund and share capital, amounting in all to 2,048,171·78fl., are invested in first-class securities. The report of the Directors of the Second Austrian Incandescent Share Company, Limited, from Dec. 16, 1896, to Aug. 18, 1897, refers to the report and accounts of the Vienna Company. The latter show that the Company paid a dividend of 120 per cent. for the year ended June 30, 1897, out of which the share of this Company amounts to £45,675. After deducting expenses of administration, the net balance is £44,736, out of which the Directors recommend a dividend of 1s. 10d. a share, free of income-tax, carrying forward £1366.

New Joint-Stock Companies.—The Acetylene Gas Light, Power, and Calcium Carbide Company, Limited, has been formed, with a capital of £80,000, in £1 shares, to adopt and carry into effect an agreement made between J. Frazer and the Company, and to carry on, whether in the United Kingdom or elsewhere, the business of manufacturers of gas and calcium carbide and the residual products thereof, and any other commodities which can be conveniently dealt in by the Company. The Pinner Gas Company, Limited, has been registered with a capital of £12,800, in 1600 "A" and 960 "B" shares of £5 each, to acquire the existing gas-works at Pinner, and the benefit conferred by the Pinner Gas Order, 1881. The Steyning and District Water Company has been formed with a capital of £8000, in £10 shares, to acquire the powers conferred by the Steyning and District Water Order of the past session, and to supply water in the districts of Steyning, Bramber, and Upper Beeding, in Sussex. The British Acetylene Gas Generator Company was registered in Edinburgh last week. The capital is £5000, in £5 shares. The Company, whose office is in Kirkcaldy, has been formed to acquire and work a patent which has been obtained by Hugh K. Spence and others, of Kirkcaldy.

Reductions in Price.—The Brighton and Hove Gas Company have made reductions of 1s., 9d., and 5d. per 1000 cubic feet in the price of gas in the outlying parts of their district. The Directors of the Salisbury Gas Company have reduced the price of gas 1d. per 1000 cubic feet. The Winchester Water and Gas Company have brought down the price of gas from 3s. 6d. to 3s. 4d. per 1000 cubic feet. A reduction of 2d. per 1000 cubic feet, to take effect from June last, has been announced by the Eastbourne Gas Company.

The Kettering District Council and the Water-Works.—At the close of the ordinary business at the meeting of the Kettering District Council on Wednesday, a special meeting was held to consider the question of promoting a Bill next session to empower them to purchase the works of the Kettering Water Company. A case had been submitted to Mr. Balfour Browne, Q.C., for his opinion; and it was read by the Clerk (Mr. H. Lamb). It was stated therein that the rateable value of the town was £88,717; the assessable value, £74,825; the amount of outstanding loans (or loans shortly to be contracted), £59,269; and the extent of the Council's borrowing powers, £149,650. The main reasons given for purchasing were the inadequate pressure of water, particularly in case of fire, and the high rates charged. Mr. Balfour Browne advised that there was every probability of the Council's application for an Act to sanction the acquisition of the water-works being successful. It was resolved, practically unanimously, to promote a Bill. On the following day, the resolution was confirmed by the ratepayers. The Council have been advised by Messrs. Stevenson and Burstal.

Newport (Mon.) Water Supply.—Our readers may probably remember that the Wentwood water scheme of the Newport Corporation, which has been designed to supply the needs of the city for the next half century, has given that body cause for anxiety from time to time. The puddle trench, which will have to bear the enormous pressure of 300 million gallons of water, has been mainly the cause of this, because a safe basis was not reached at the depth assigned by some 50 or 60 feet, and because a rift appeared in one part of the concrete with which the trench is being filled. The Water Committee, who are carrying out the work themselves, have called in their Consulting Engineer, Mr. Baldwin Latham, M.Inst.C.E., for probably the last time. He is understood to believe wholly in the ability of the trench to be sound and water-resisting to the utmost; but he suggests, if the authorities want to "make assurance doubly sure," an inner wall or curtain of concrete, 24 inches thick, to help to take off a portion of the pressure on the main embankment. This, or a further strengthening of the trench itself by increasing the horizontal width of it and making it slope at a less angle, will probably be found to be the right course. The cost of this further work will be an additional £15,000 or £20,000. Already £100,000 have been spent on the undertaking. A special meeting of the Town Council will be called at an early date to consider the progress and bearings of the scheme in the light of the report Mr. Baldwin Latham is understood to be preparing.

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An Illustrated Advertisement of the Plant will appear next week.

Conway and Colwyn Bay Water Board.—At a recent special meeting of the Board, Mr. R. S. Chamberlain was present to advise them as to the award of the Arbitrator in the recent dispute as to the extension of the water-main from Sarn Mynach through Colwyn Bay to Llysfaen; some of the Colwyn Bay members having held (*ante*, p. 65) that the award was not binding. Mr. Chamberlain stated that there could be no doubt on the point. Colwyn Bay would have to pay for its new main, but the Cowlyd Board were bound to supply Llysfaen with water; and while the Colwyn Bay Council could not refuse to allow the Llysfaen supply to pass through their main, they could at the same time claim compensation from the Cowlyd Board for the use of the pipes. Mr. T. Parry, who presided, said he was quite satisfied with this view of the matter. If Colwyn Bay could have compensation and own its water-main, he thought the ratepayers would be content. Alderman Hughes, one of the Conway members, asked Mr. Chamberlain as to the legality of the cheque for £3500 paid to the Contractor (Mr. Sheffield) passed at the previous meeting. Mr. Chamberlain replied that the Cowlyd Board let the contract, and therefore were clearly liable to the Contractor. With reference to the claim of the Contractor for the original scheme (Mr. Bugbird), amounting to £1700, a balance said to be due, the Board offered £1380; but this was declined.

Dawlish Water Supply.—More than a year ago, the Dawlish District Council applied to the Local Government Board for sanction to an expenditure of £925 on works for improving the water supply. An inquiry was held, but apparently the decision of the Board has never been communicated to the Council, and some of the members are of opinion that another and larger scheme should be taken in hand. At a recent meeting of the Council, the Chairman (Mr. G. B. Avant) proposed that application should be made for permission to borrow sufficient money for the provision of an impounding dam at the Thorns, the laying of a main to the Burrows, and the erection of an additional storage reservoir there. He said that, though the suggested reservoir might not be wanted immediately, they ought to get permission to borrow the money, so that when it was required they would not have to go over the same ground again. The estimate of the Surveyor was that the impounding dam would cost £1676; filter-beds, £242; and a 5-inch main, £1760—making a total of £3678. Several members of the Council pointed out that they were already pledged to a scheme, and that before adopting another the resolution relating to the former one should be rescinded. It was suggested that the Local Government Board were not favourable to the former project, or they would have approved of it long ago. It was finally resolved to ask the Board to send down an expert to advise the Council on the matter.

The Water Supply of Worthing.—Mr. E. P. Burd, one of the Inspectors of the Local Government Board, was at Worthing a few days since, for the purpose of holding an inquiry as to a proposed adjustment of the water charges as between the old Local Board district and West Worthing, as provided for in the Charter of Incorporation. The Council was represented by the Town Clerk (Mr. W. Verrall), who pointed out that the state of affairs at the date of the Charter in 1890 was very different to the present time. Then the old Local Board had works from which they were enabled to supply the district with water at an average rate of 10d. in the pound; while at West Worthing the water-works were in the hands of a Company, and the charge for water was at least 1s. 9d. in the pound. In 1894, following immediately on an epidemic in the town, negotiations resulted in an arrangement to transfer the works to the Corporation for £23,467. The Local Government Board sanctioned the purchase of the works on the express condition that they were to be closed as soon as new works could be provided for the district; and, with a view to bringing the matter to a settlement, it had been suggested that both districts should be looked upon as being without water supply so far as past transactions were concerned, and placed upon an equal footing as regards water charges in the future. Replying to questions, the Town Clerk stated that the new works would cost, roughly speaking, about £36,000; and, in addition to this, there was the sum paid for the West Worthing works £23,467, less £710 since paid off, and the cost of the old Worthing works £20,793, less the sinking fund which now amounted to £5530, or a total debt for water purposes of about £74,000. Alderman Piper and Mr. W. Sams gave evidence as to the Corporation proposals.

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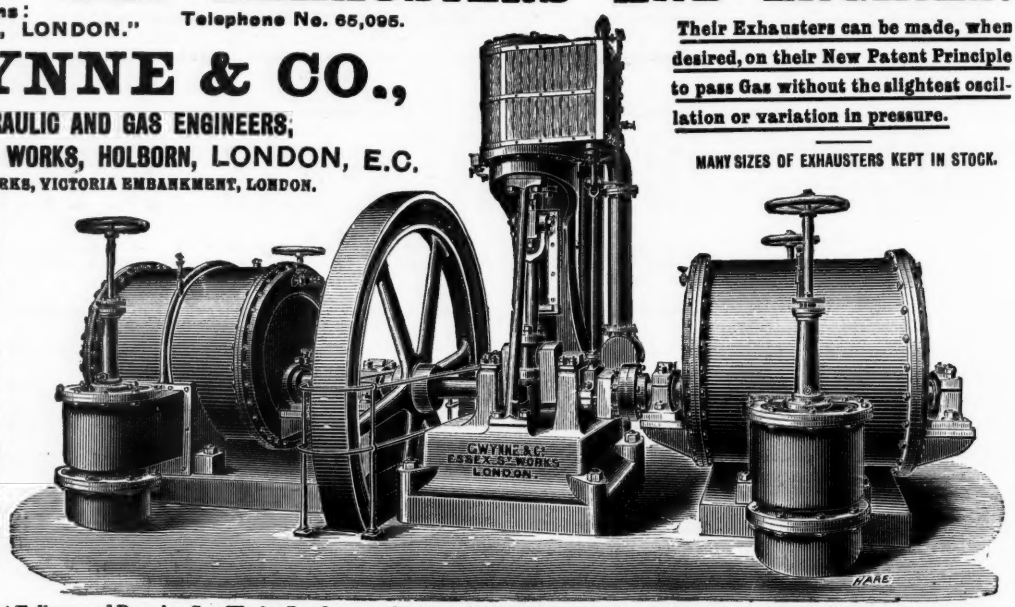

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[For Illustrated Advertisement, see Aug. 3, p. 250.]

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WANTED by the Advertiser, a situation as MANAGER of a small Country Gas-Works. Twenty Years' Experience as Manager. Eight Years' excellent character from last Employers.
Address W. Cox, Webb's Buildings, Chew Magna, SOMERSET.

GAS Examiner desires a re-engagement. Practical experience of the Chemistry of Gas Manufacture, Testing under the Metropolis Gas Act and Gas-Works Clauses Act, conversant with drawing Reports under these Acts, and General routine. Testing of Gas-Works Residuals, &c.
Address No. 2912, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

AN opening is offered to a Fitter who is seeking to qualify as Working Manager of small Gas-Works.
Apply, by letter, to No. 2909, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Man to make Gas and do the work on a small Gas-Works. Good Character indispensable.
Apply, by letter, with Particulars and stating lowest Wages, to No. 2910, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

PUPIL WANTED.

A VACANCY will occur next Month for a PUPIL in the Office of a Gas Engineer in the Midland Counties. A large portion of the Premium will be returnable as Salary during the Three Years' Apprenticeship.
For full Particulars, apply, by letter, to No. 2901, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

CITY OF RIPON.

GAS AND WATER MANAGER WANTED.

THE Corporation of the City of Ripon are desirous of appointing a thoroughly Practical, Steady, and Trustworthy Person as MANAGER of their GAS AND WATER WORKS.
Applicants must not be under 25 or more than 45 years of age, and must produce three Testimonials, of recent date, of Character and Efficiency.
The Salary at commencement will be, as Gas Manager, £100 per annum, with house rent and rates free, coals, gas, and water found, and an office clerk provided; and as Water Manager, £25 per annum.
Printed Particulars of the appointments and duties will be forwarded on application.
Canvassing the Corporation will disqualify.
Applications must be sent in not later than 4 p.m. on Tuesday, the 21st of September next, to
M. KIRKLEY,
Town Clerk.
Ripon, Aug. 27, 1897.

SADLER & Co., Ld., Middlesbrough; ULVERSTON (BARROW); PORTSMOUTH; CARLTON (N.E.R.); and STOCKTON. Tar and Petroleum Distillers. Benzol and Petroleum Spirit, 700 and other Gravities specially prepared for Carburetting. SOLAR OIL for Gas Making, Kerosene, &c.
Correspondence invited.
Telegraphic Address: "Sadler, Middlesbrough."

SPECIAL PAINT FOR GAS-WORKS.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS.
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1759.

ALEX. P. KER, C.E., Consulting Gas Engineer, Hunton Road, Gravelly Hill, Birmingham, 25 Years Assistant Engineer and Manager of Works to the Corporation of Birmingham and their predecessors, MAY BE CONSULTED on all matters connected with GAS ENGINEERING, including Valuations, Alterations, Additions and Extensions, &c. REPORTS upon EXISTING WORKS and IN PROGRESS. EXAMINATIONS OF GAS for ILLUMINATING POWER and IMPURITIES conducted. Plans, Specifications, and Estimates prepared.

ECONOMY IN PURIFICATION.

INCREASE the Efficiency of your PURIFIERS by adopting CRIPPS'S PATENT BYE-PASS VALVE in the lower Tiers of Sieves. Practical Experience proves their Economy. Engineers are repeating orders after thorough trial.
References and Particulars can be obtained from the Makers—
C. & W. WALKER, Midland Iron-Works, Donnington, near Newport, SALOP.
And J. EVERY & SON, Phœnix Iron-Works. LEWES.

STOKER wanted.
For particulars, apply to the MANAGER, Gas-Works, Halesowen, near BIRMINGHAM.

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BRIMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

WANTED, a Second-hand Washer, or WASHER-SCRUBBER, having 6-inch or 8-inch Connections.
Give full Particulars, and Price put on Rail, to No. 2908, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a good Second-hand SCRUBBER, from 3 feet to 4 feet diameter and 15 feet to 25 feet high, 6-inch Connections and Valves, Distributor, &c., complete.
Particulars and Price to No. 2911, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

PURIFIERS FOR SALE.

EIGHT or Four C. & W. Walker's Puri- FIERS, 12 feet square by 4 feet deep, with Six 12-inch Bye-Pass Four-Way Valves and Connections, complete, with fixed hydraulic lifting gear.
For further Particulars, apply to H. WILKINSON, Secretary and General Manager, Gas Company, HARROGATE.

WHITE'S "Automatic Flash-Light for Incandescent Burners." (See "JOURNAL OF GAS LIGHTING" for Aug. 24, 1897.) BURNER MAKERS and OTHERS, prepared to undertake the Manufacture of the above Apparatus, are invited to correspond with CHARLES WHITE, Gas-Works, BLAENAVON, or THOS. H. WHITE, Gas-Works, Cwmbran, MON.

GAS-PUMP for Sale, horizontal, one Steam Cylinder, 18-inch bore, and two Gas Cylinders, 17½-inch bore, all 24-inch Stroke, on massive Bed-Plate, with heavy Fly-Wheels. Very strong. First-Class Make. Not much used.
Apply, by letter, to No. 2878, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS ENGINEERS AND CONTRACTORS.

TO BE SOLD, at low prices—
STATION-METER, in circular Case, to pass 15,000 cubic feet per hour.
GASHOLDERS, 25 feet, 45 feet, and 50 feet diameter.
A large number of GAS-VALVES, 2-inch to 12-inch.
Ditto, three-way and four-way rising PLUG and CENTRE VALVES.
500 Hexagonal STREET LANTERNS, Shadowless, Puttyless, and all parts interchangeable. For exportation, they pack so as almost to go as dead weight. Many thousands of them have been in use for the past 30 years.
An Eight-Horse VERTICAL ENGINE AND CORNISH BOILER.
DRY GAS-METERS, 80-light and 200-light.
WET METERS, in Cast-Iron Cases,—

3,	5,	30,	50.	80,	100-light.
Number 80,	30,	45,	30,	1,	1.

60 WET METERS, 10-light, in Tin-Plate Cases.
PETRIGEN, a new Cement which melts at 250° Fahr. and sets as hard as stone immediately. Very useful for Joint-making, and for many purposes about a Gas-Works.
New Standard Bower Regenerative GAS-LAMP.
Apply to GEORGE BOWER, St. Neots, HUNTS.

SULPHATE OF AMMONIA SATURATORS.

WALTER THOMASON and SONS, Chemical Plumbers, &c., and Makers of Lead Saturators, &c., 21, WESTON STREET, BOLTON. Repairs of every description.
Please write for Estimate before ordering elsewhere.

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

HYDRATED OXIDE OF IRON.

PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

IMPORTANT TO GAS ENGINEERS AND MANAGERS.

YOUR old Retorts made as good as new by Repairing them with CROWTHER'S STICK-FAST FIRE CEMENT. Can be used in Hot or Cold Retorts. Unequalled for the Repair of Inclined Retorts. Satisfaction Guaranteed.
Write CROWTHER, Practical Retort Setter, Manor Street, HUDDERSFIELD.

FOR SALE—A Station Meter complete, in thorough working order. Recently overhauled and certified correct by Messrs. Braddock. Capacity, 50,000 feet per hour.
Apply to JOHN H. DARBY, Brymbo, near WREXHAM.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also COMPLETE WORKS equal to 7000, 20,000, 60,000 cubic feet per diem. **Inquire and compare Prices and Particulars before ordering elsewhere.**
J. F. BLAKELEY, Gas Engineer, Ravensthorpe, YORKS.

SPECIAL Bargains if sold before re- moval. "LIVESEY" WASHER, 3 6-inch Valves and Pipes. Wrought-Iron SCRUBBER, 5 ft. by 15 ft. Cast-Iron SCRUBBER, 5 ft. by 30 ft., both filled with boards. STATION METER, 6000 cubic feet per hour. 8-inch and 20-inch STATION GOVERNORS. ROTARY EXHAUSTERS, 2500, 7000, and 15,000 feet per hour. All in good order.
Address No. 2913, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

CONTRACT FOR GAS COALS.

THE Milton-next-Sittingbourne Urban District Council invite TENDERS for the supply and delivery, during the year ending Oct. 6, 1898, of 1000 Tons of GAS COALS, to be supplied at such times and in such quantities as the Manager of the Gas-Works shall direct.
Full Information, with Form of Tender, can be obtained of the Manager, Mr. A. Davison, Gas-Works, Milton-next-Sittingbourne.
Sealed tenders, which must be on the form supplied, should be addressed to the Chairman of the Milton-next-Sittingbourne Urban District Council, and endorsed "Tender for Gas Coals."
The tenders should be sent or delivered to me on or before Monday, Sept. 20 next.
The Council do not bind themselves to accept the lowest or any tender.
By order,
WM. PARHAM,
Clerk.
Milton-next-Sittingbourne,
Kent, Aug. 24, 1897.

CORPORATION OF LEICESTER.

SULPHURIC ACID.

THE Gas and Electric Lighting Com- mittee of the above Corporation are prepared to receive TENDERS for the supply of SULPHURIC ACID, made either from native Sicilian Brimstone, or recovered Sulphur, or Pyrites. Specific gravity in each case to be stated.
The Price to include free delivery by Rail into elevated Tanks, 27 feet high, at the Chemical Works, Aylestone Road.
Probable quantity, about 1700 Tons, to be delivered as required during the ensuing Twelve Months.
Tenders, addressed to Alderman Lennard, Chairman, and endorsed "Tender for Acid," to be delivered at these Offices not later than Eleven o'clock a.m., on Saturday, Sept. 11.
The Committee do not bind themselves to accept the lowest or any tender.
ALFRED COLSON, M.Inst.C.E.,
Engineer and Manager.
Offices: Millstone Lane,
Leicester, Aug. 20, 1897.

BOROUGH OF WIDNES.

THE Corporation invite Tenders for the purchase of from 900 to 1000 Tons of GAS TAR from their Gas-Works for Twelve Months ending the 30th of September, 1898.

Forms of Tender and Conditions of Contract may be obtained from Mr. Isaac Carr, Assoc.M.Inst.C.E., Gas-Works, Widnes.

Tenders, endorsed "Tar," to be delivered to the undersigned not later than the 6th of September prox.

The Corporation do not bind themselves to accept the highest or any tender.

H. S. OPPENHEIM,
Town Clerk.

Town Hall, Widnes,
Aug. 18, 1897.

SMETHWICK GAS-WORKS.

TENDERS FOR NEW OXIDE AND SPENT OXIDE.

THE Gas Committee invite Tenders for the supply of 120 Tons of OXIDE OF IRON for purifying, delivered at Soho Station (L. & N.W. Rly.), Handsworth Station (G.W. Rly.), or at the Gas-Works, by Canal Boat.

Also TENDERS for the Purchase of about 300 Tons of SPENT OXIDE, Samples and Particulars of which may be obtained of the Manager at the Gas-Works.

Tenders, endorsed and addressed to the Chairman, to be delivered to the undersigned at the Gas Offices, Public Buildings, Smethwick, not later than the 14th of September.

By order,
W. J. STURGES,
Secretary.

NORTHAMPTON GASLIGHT COMPANY.

TENDERS FOR TAR.

THE Directors are prepared to receive TENDERS for the purchase and removal of the surplus TAR produced at their Works, for a term of One or Two Years.

Quantity produced, about 2800 Tons per annum.

Particulars may be had on application.

The Tar will be loaded into Boats or into Railway Tank Waggons on the L. & N.W. Railway.

The Directors do not bind themselves to accept any tender.

Tenders, marked "Tender for Tar," to be delivered at the Company's Office on or before Tuesday, Sept. 14, 1897.

JOHN EUNSON,
Engineer.

Gas-Works, Northampton,
August, 1897.

SOUTH METROPOLITAN GAS COMPANY.

SALE BY TENDER OF £43,333 6s. 8d. THREE PER CENT. PERPETUAL DEBENTURE STOCK.

MINIMUM PRICE, £105 PER CENT.

NOTICE is Hereby Given, that it is the intention of the Directors of this Company to SELL BY TENDER £43,333 6s. 8d. of THREE PER CENT. PERPETUAL DEBENTURE STOCK, in accordance with the Provisions of the South Metropolitan Gas Acts, 1882 and 1896.

Particulars of same, with Form of Tender, can be obtained at this Office on application to the undersigned; and tenders must be sent in on or before Tuesday, the 14th day of September, 1897.

The Stock will be allotted to the highest bidders; but no tender will be accepted at a lower price than at the rate of £105 money for each £100 Debenture Stock.

By order,
FRANK BUSH,
Secretary.

Offices: 709a, Old Kent Road, S.E.,
Aug. 18, 1897.

ISSUE OF STOCKS AND SHARES BY AUCTION UNDER PARLIAMENTARY POWERS.

MR. ALFRED RICHARDS undertakes the issuing by Auction of GAS AND WATER SHARES under Parliamentary Power.

He also holds MONTHLY SALES of GAS AND WATER SHARES at the Auction Mart, Tokenhouse Yard, E.C.

Terms for the issuing of Capital, and also for offering to auction Gas and Water Shares, and all Particulars relating thereto, may be had of Mr. Alfred Richards.

Offices: 18, FINSBURY CIRCUS, E.C.

Now Ready, Price 10*s.* 6*d.*

WARNER'S DIAGRAMS
OF THE ANNUAL
AVERAGES OF PARLIAMENTARY RETURNS RELATING TO GAS UNDERTAKINGS,
1887 TO 1895.

Together with the Private and Public Undertakings Grouped—1895 and 1896 Workings.

COMPILED BY
W. J. WARNER, of South Shields.

These Diagrams, which were noticed in the "JOURNAL" for Aug. 24, 1897, may be had of

WALTER KING, 11, Bolt Court, FLEET ST., E.C.

ROBERT MARSHALL,
CANNEL COAL MERCHANT,
97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on Application.

E. ASQUITH & CO.,
Hydraulic Engineers,
17, Mather Street, Ancoats, Manchester,
Fit up Plants for
Pressing Anthracene, Naphthalene, &c.
Competent Men sent out to erect same. Estimates given.

JAMES OAKES & Co.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.,
Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

THOMAS TURTON
AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.
LONDON OFFICE:
90, CANNON STREET, E.C.

HOLMSIDE GAS COALS.
PRESENT DAILY PRODUCE OVER 4000 TONS.

LATEST ANALYSIS—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation.

Yield of Gas Per Ton . . 11,205 Cubic Feet.
Illuminating Power, 16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality) 13¾ Cwt. Per Ton.
Sulphur . . . . A little over 1 Per Cent.
Ash . . . . . Under 1 Per Cent.
Tar . . . . . 163 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 103 Lbs. (Avoir.) Per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR PELTON GAS COALS.
PRESENT DAILY PRODUCE AVAILABLE 2500 TONS.

RESULTS OF DIFFERENT ANALYSES:—

Yield of Gas Per Ton . . 10,500 Cubic Feet.
Illuminating Power . 17 Stand. Sperm Candl.
Coke (of excellent quality) . 13½ Cwt. Per Ton.
Sulphur . . . . . 1·13 Per Cent.
Ash. . . . . 1·34 Per Cent.
Tar. . . . . 180 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 94½ Lbs. (Avoir.) Per Ton.

The HOLMSIDE and SOUTH MOOR COAL-FIELD possesses *a very great quantity of the best Coal;* and, whilst other Coal-Fields are becoming exhausted, this one is only being opened out, so that *the quality* of both the HOLMSIDE COALS, and the SOUTH MOOR COALS *may be relied upon for all practical purposes.*

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,
HOLMSIDE AND SOUTH MOOR OFFICES,
NEWCASTLE-UPON-TYNE.

Telephone: Castleford No. 214. | Postal Address: Castleford.
Telegrams: "Silkstone Castleford."

THE SILKSTONE & HAIGH MOOR COLLIERIES, LTD.
ALLERTON BYWATER, CASTLEFORD.

Steam, Manufacturing, & Gas Coals & Cannel

Analysis, Contracts, Trial Waggons, and Quotations for Large and Small Orders. Inquiries Solicited.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.

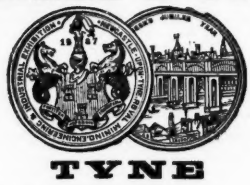
QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

THE SILICA FIRE-BRICK COMPANY,
OUGHTIBRIDGE, near SHEFFIELD,
MANUFACTURE
SILICA BLOCKS, BRICKS, AND CEMENT
OF SUPERIOR QUALITY
FOR GAS-FURNACES.

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their
GREATER DURABILITY,
Strongly recommended where EXCESSIVE HEATS have to be maintained.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887,
for
CANNEL & COAL.



TYNE
BOGHEAD CANNEL.

Yield of Gas per ton . . . . . 13,155 cub. ft.
Illuminating Power . . . . . 38·22 candles.
Coke per ton . . . . . 1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 17·8 candles.
Coke . . . . . 70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 73·1 per cent.

For Prices and complete Analysis, apply to
THOS. W. DANCE & SONS,
COAL OWNERS, NEWCASTLE-ON-TYNE;
OR
E. FOSTER & CO.,
21, JOHN STREET, ADELPHI, LONDON, W.C.

TROTTER, HAINES, & CORBETT,

Brettell's Estate

FIRE-CLAY & BRICK WORKS,

STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.

Proprietors of

BEST GLASSHOUSE POT & CRUCIBLE CLAY.

Shipments Promptly and Carefully Executed.

London Office: R. Cull, 34, Old Broad St., E.C.

HEBBURN MAIN GAS COALS.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.

For Prices, f.o.b. Ship or Delivered by Rail, apply to

THE WALLSEND & HEBBURN COAL COMPANY, LTD.

3 Lombard Street, NEWCASTLE-ON-TYNE.

W. RICHARDSON, Fitter.

BOLDON GAS COALS.

ANALYSIS.

Yield of Gas per ton .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

For Prices, &c., apply to

W. H. PARKINSON,

THE HARTON COAL CO., LTD.,

NEWCASTLE-ON-TYNE.

Telegraphic Address: "PARKINSON NEWCASTLE."

EVESON FOR CANNEL

Telegrams:

"EVESON, BIRMINGHAM."

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD

BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.

RAVENSTHORPE, near DEWSBURY.

HEATHCOTE GAS COAL.

Rich in Illuminating Power and Yield of Gas. Above the Average in Weight and Quality of Coke.

Maintains a High Standard in Residuals.

THE GRASSMOOR CO., Ld.,

CHESTERFIELD.

LONDONDERRY GAS COALS

FROM THE

MARQUIS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by Mr. John Pattinson, F.C.S., F.I.S.

For Prices and Particulars, apply to

S. J. DITCHFIELD,

SEAHAM HARBOUR, COUNTY OF DURHAM.

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON & COAL Co., Ld.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by

Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton . .	10,500	Cub. Ft.
Illuminating Power . .	16·9	Candles.
Coke (of good quality) . .	67·5	per Cent.
Sulphur	0·58	„
Ash	2·73	„

For Price, &c., apply to the

WEARDALE IRON & COAL Co., Ld.

QUAYSIDE, NEWCASTLE-ON-TYNE.

JOHN BROWN & CO., Ltd., SHEFFIELD.

Proprietors of

ALDWARKE MAIN, CAR HOUSE & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

ALDWARKE MAIN GAS COAL

Analysis: 12,600 Feet of 19-Candle Gas per Ton.

Value in Pounds of Sperm, 820·80.

VERY FREE FROM IMPURITIES.

TELEGRAMS: "ATLAS, SHEFFIELD."

LONDON OFFICE

60 QUEEN VICTORIA ST. E.C.

TELEGRAPHIC ADDRESSES
"DRAKESON HALIFAX."
"ECLAIRAGE LONDON."

TELEPHONE No 43.
"HALIFAX EXCHANGE"

GAS ENGINEERS.
CONTRACTORS.
IRONFOUNDERS.

RETORT SETTERS.
FURNACE BUILDERS.
ETC. ETC.

JONAS DRAKE & SON

SOLE AGENTS FOR

HISLOP'S

PATENT REGENERATIVE FURNACES

— FOR —

ENGLAND, WALES & ABROAD.

RETORT BENCHES ERECTED COMPLETE WITH OR WITHOUT SPECIAL FURNACES.

RESULTS GUARANTEED.

OVENDEN HALIFAX

Designs and Estimates on Application.

GASEOUS FIRING A SPECIALTY.

PENNY-IN-THE-SLOT GAS-METERS,
SHILLING-IN-THE-SLOT METERS.
Every Description of ORDINARY GAS-METERS.

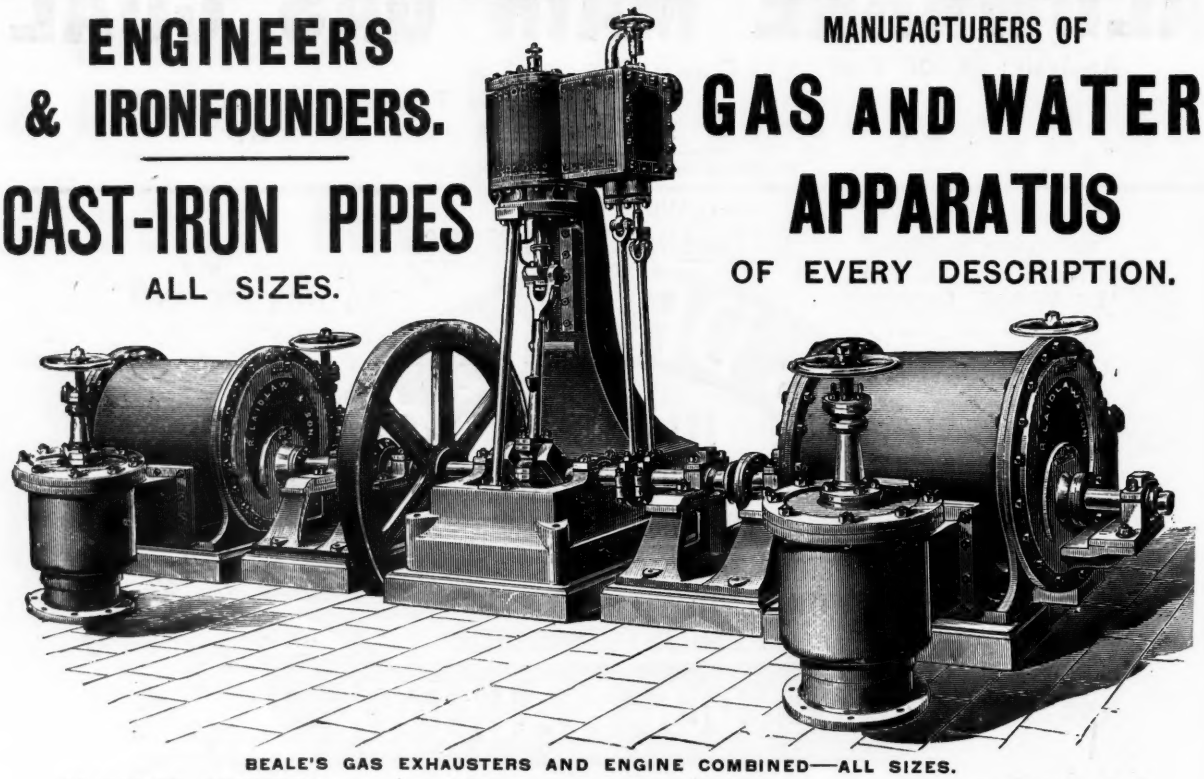
THE AUTOMATIC
GAS-METER (1895) CORPORATION, LTD.

ROCK METER WORKS,
TORTWORTH STREET, STRANGEWAYS, MANCHESTER.
London Address: 59, QUEEN VICTORIA STREET, E.C.

G. & J. HAIGH,
Raven's Lodge Fire-Brick Works, DEWSBURY.

FIRE-BRICKS of the highest Quality, made from Fire-Clay of a most Superior and Refractory Character, suitable for GLASS-WORKS, GAS-WORKS, and BLAST-FURNACES.
WHITE GLAZED AND SALT GLAZED BRICKS, BUFF FACING BRICKS, &c.
For Prices and Analysis, apply as above.

R. LAIDLAW & SON
ENGINEERS
& IRONFOUNDERS.
MANUFACTURERS OF
GAS AND WATER
APPARATUS
OF EVERY DESCRIPTION.
CAST-IRON PIPES
ALL SIZES.



BEALE'S GAS EXHAUSTERS AND ENGINE COMBINED—ALL SIZES.

ALLIANCE FOUNDRY, GLASGOW. | SIMON SQUARE WORKS, EDINBURGH. | 6, LITTLE BUSH LANE, LONDON, E.C.

THE "TRAFALGAR"
PREPAYMENT GAS-METER
FOR PENCE, SHILLINGS, OR ANY COINAGE.

THE ADVANTAGES OF THIS SYSTEM ARE:

1. Simplicity of Mechanism.
2. Absolute Accuracy.
3. Impossibility of being tampered with.
4. Unaffected by irregularities in shape or thickness of the penny.
5. Can be fixed to any ordinary Wet or Dry Meter.
6. Extra large Money-Box.
7. Price Changer can be altered without otherwise disturbing the Meter.
8. Index showing number of pennies in the mechanism at any time.
9. Rejection of half-pennies certain.

GUARANTEED FOR FIVE YEARS.

FRANK WRIGHT'S PREPAYMENT GAS-METER CORPORATION, Limited,

Telegraphic Address: "Gasometer, London." | Manufacturers of Wet and Dry Gas-Meters. Offices and Works: 62, GLENGALL ROAD, S.E. | Telephone No. 59 Peckham.

TELEGRAMS: "FIRECLAY," LEEDS.
TELEPHONE No. 612.

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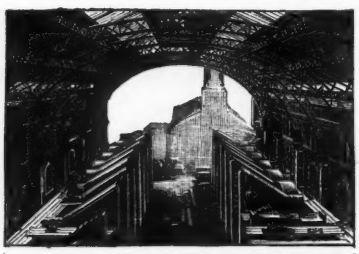

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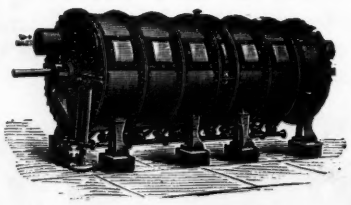

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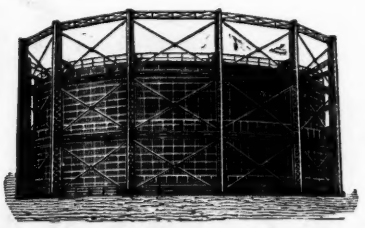

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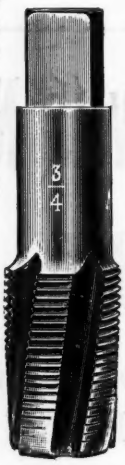

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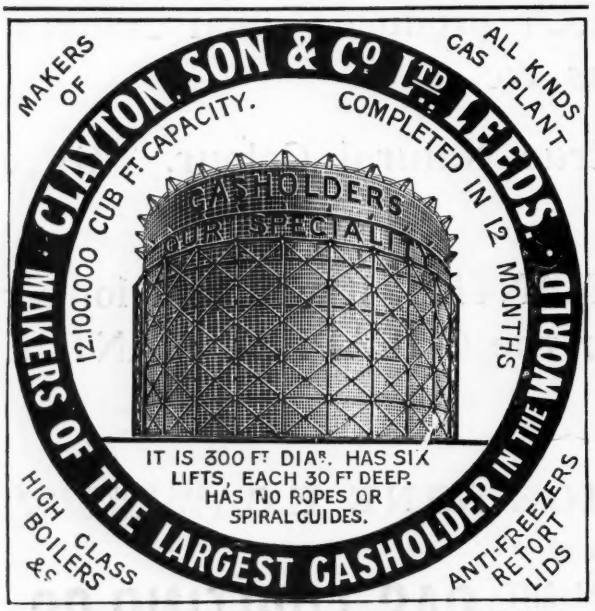
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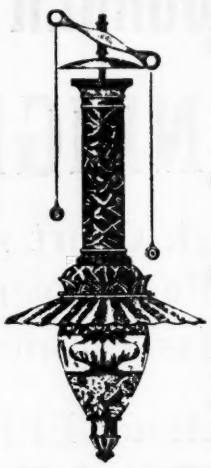

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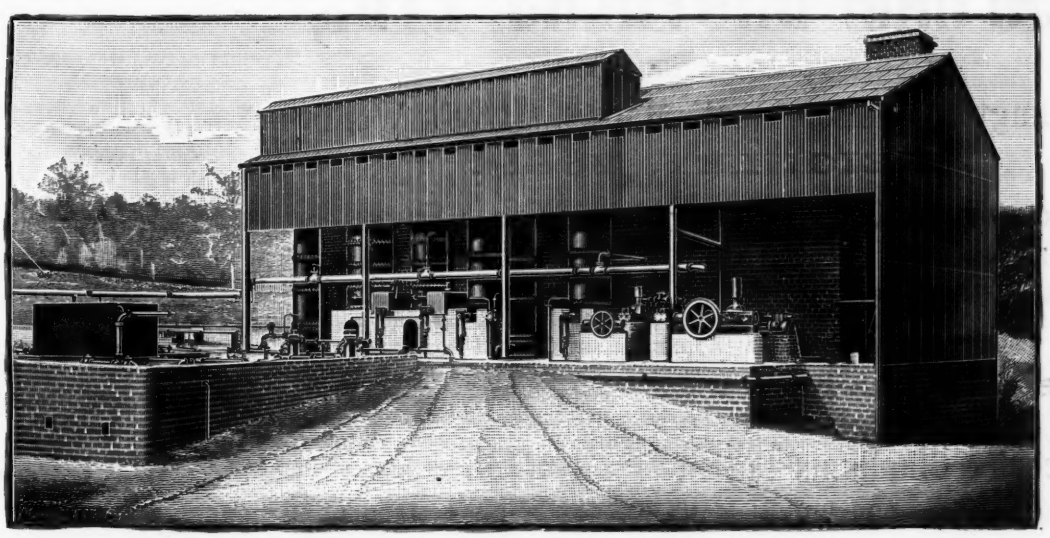

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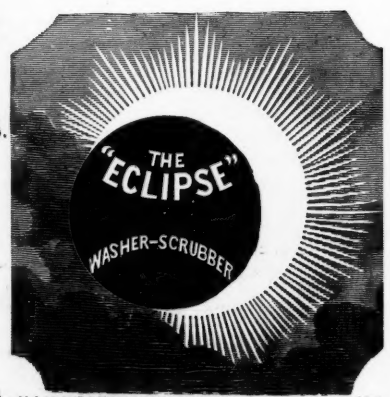

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